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Flood Impact Support Tool (FIST) User's Manual and Technical Documentation

by Jerrell R. Ballard, Jr., Margaret Rose Kress

Prepared for U.S. Army Engineer District, Vicksburg

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U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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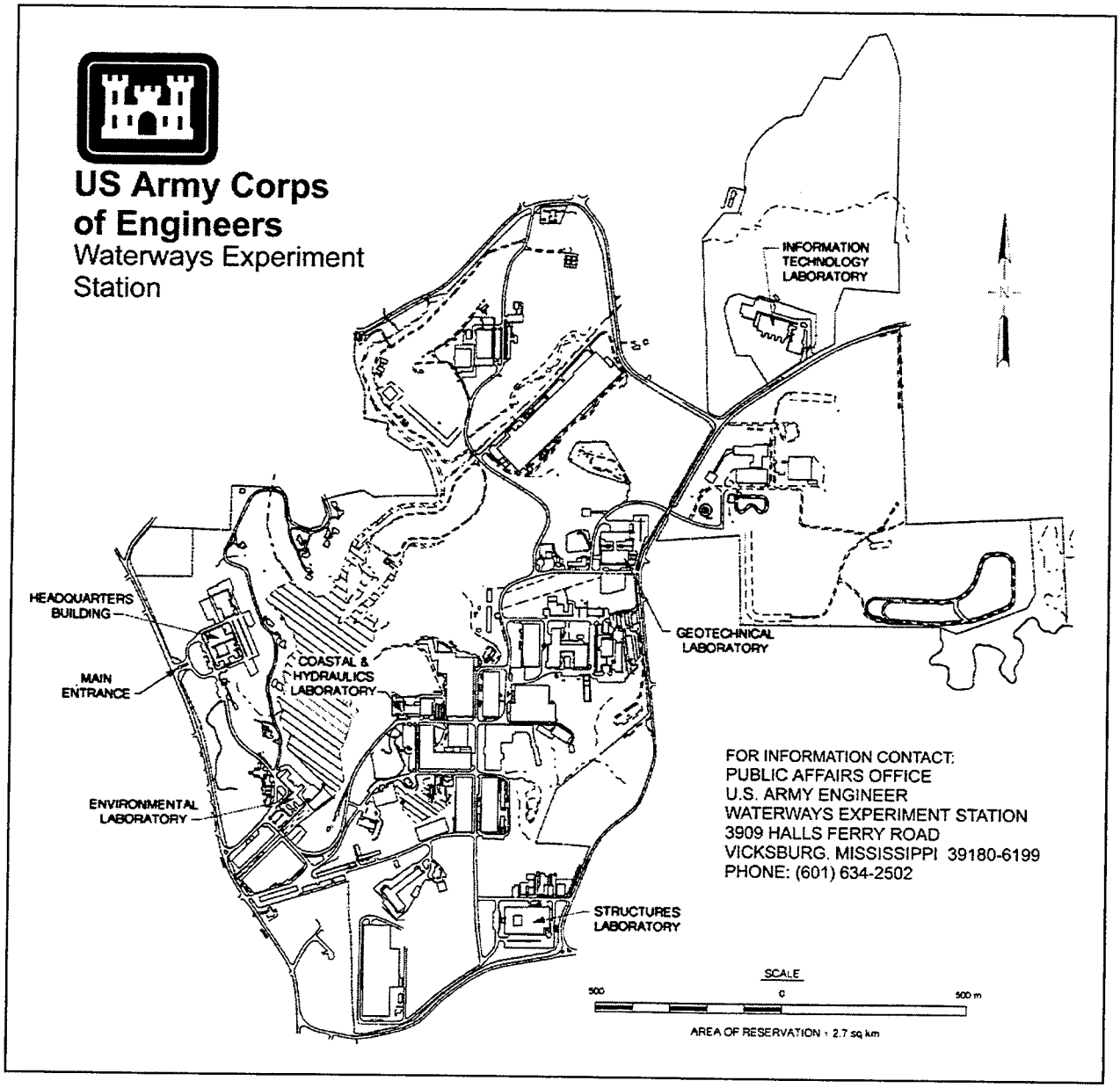

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Preface

The work described herein was conducted by personnel of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS, from September 1994 to January 1996. The study was funded by the U.S. Army Engineer District, Vicksburg. Technical Monitor was Mr. Rayford Wilbanks, Economist, Planning Division, Vicksburg District.

The report was prepared by Mr. Jerrell R. Ballard, Jr., and Dr. Margaret Rose Kress of the Environmental Characterization Branch (ECB), Natural Resources Division (NRD), Environmental Laboratory (EL), WES. Mr. Scott Bourne, ECB, contributed to data analysis and software debugging.

The study was conducted under the general supervision of Drs. John Harrison and John W. Keeley, Director and Assistant Director, EL, respectively, and Dr. Robert M. Engler, Chief, NRD, and under the direct supervision of Mr. Harold W. West, Chief, ECB.

At the time of publication of this report, Commander of WES was COL Robin R. Cababa, EN.

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
acres	4,046.873	square meters
feet	0.3048	meters
inches	2.54	centimeters
miles (U.S. statute)	1.609347	kilometers

1 Introduction

Existing methods for estimating economic damage from floods in the Lower Mississippi River Valley (LMV) provide limited decision-support products for managers. The current methods rely on the utilization of hydraulic and existing data that in many cases must be modified and updated to correspond to the flood conditions. Current damage-estimation methods are limited and have no graphic or map-based products.

This guide describes a new approach to determining flood damages that overcomes many of the limitations of the existing methods. The Flood Impact Support Tool (FIST) is a prototype that uses a geospatial-based (GIS-assisted) flood damage estimation methodology.

The primary objective for the development of FIST was to improve decision-support products related to flood impacts. Other objectives were (a) to increase the flexibility and life cycle of economic data; (b) to provide full data update and analysis capabilities; and (c) to demonstrate the integration of dynamic, spatially referenced databases with flood damage modeling.

The LMV floodplain is divided into Water Resource Units (WRU) for flood control and flood damage assessment purposes. Figure 1 illustrates the complex pattern of the WRUs. FIST is designed to determine flood damages for individual WRUs under specified flood conditions. Flood conditions are defined by river stages (measured or predicted). Four of the WRUs in Figure 1 were used during development of the prototype FIST. Spatial and economic databases were developed for two WRUs in the Vicksburg District (VXD031 and VXD046) and two WRUs in the New Orleans District (NOD038 and NOD053).

The FIST was developed by the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, for the Lower Mississippi Valley Division Support Element for Flood Impact Assessment. This Support Element, housed at the Vicksburg District, provides decision support for flood impacts in the St. Louis, Memphis, Vicksburg, and New Orleans Districts.

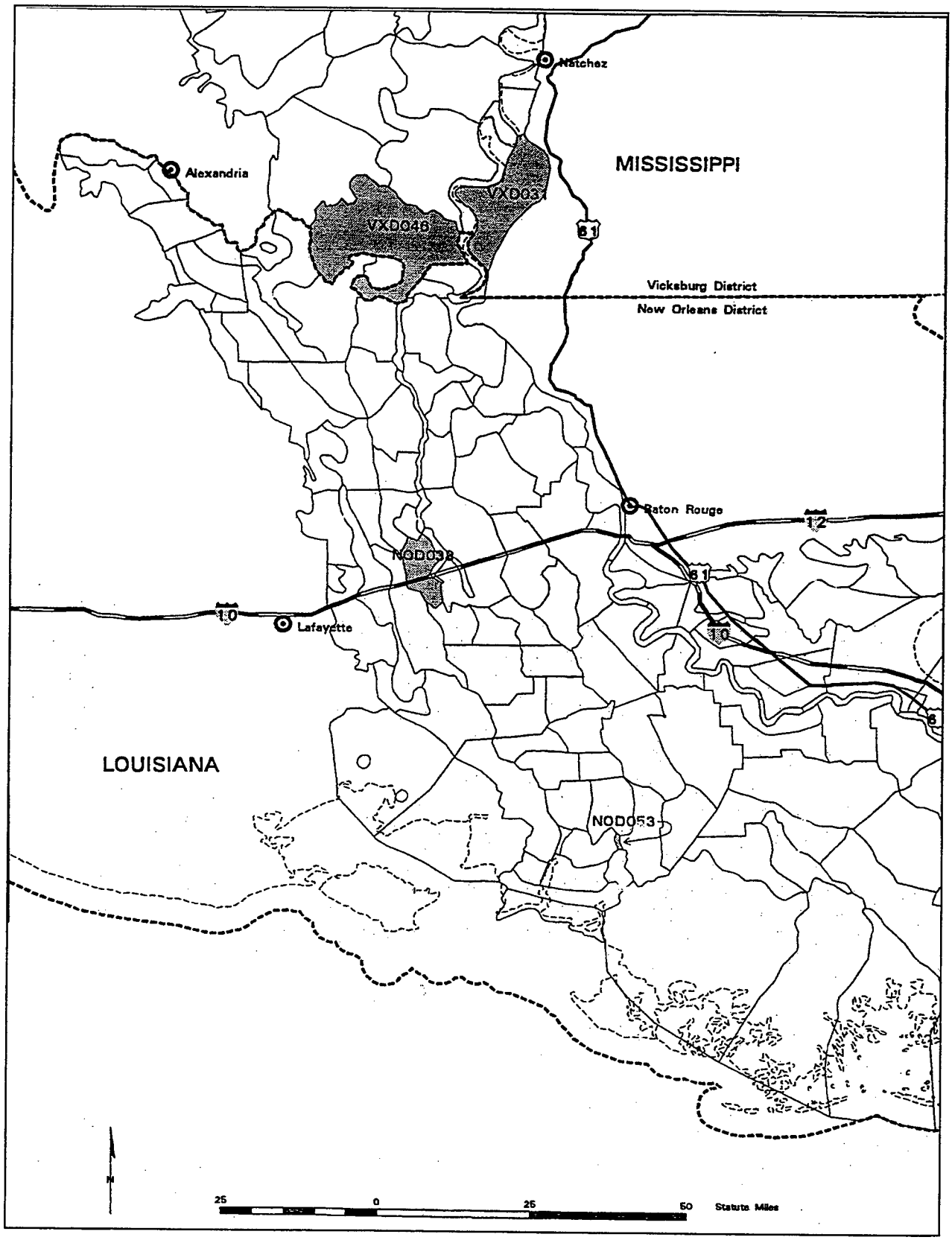


Figure 1. Four WRUs used during development of prototype FIST

This guide contains an overview of FIST, information about software and hardware requirements; installation, operation, and user input requirements; and examples of output products.

2 Components of FIST

FIST utilizes a combination of spatial analysis techniques and high-resolution geospatial data to estimate economic damage under specified flood conditions. There are four main components to FIST:

a. Fully functional commercial off-the-shelf (COTS) geographic information system (GIS).

b. High-resolution geospatial databases.

c. Flood damage model.

d. Custom-designed user interface.

Each of these are briefly described below.

GIS

The GIS serves as the database manager, provides access to a complete range of spatial analysis capabilities, and establishes the graphic display environment. ARC/INFO from Environmental Systems Research Institute (ESRI) is the GIS used for FIST. The operational concepts and flood damage modeling approach used for FIST could be implemented in other COTS GIS products as well.

Databases

The high-resolution databases describe the physical terrain, man-made structures, and land-cover conditions in each WRU included in the study. The database for each WRU has two primary parts. The first is the three-dimensional digital topographic elevation model of the WRU. The second is the spatially referenced structure database containing the location, elevation, and value of residential and commercial structures in the WRU. Complete documentation of FIST database requirements and development is given in Chapter 5.

Flood Damage Model

FIST includes a flood damage model designed to run in conjunction with and utilize the capabilities of ARC/INFO. It includes programs written in the C programming language and routines written in the ARC/INFO Advanced Macro Language (AML). FIST automates the flood damage calculation process, executes the flood extent calculation, determines and stores the economic damage estimates, and generates output products.

User Interface

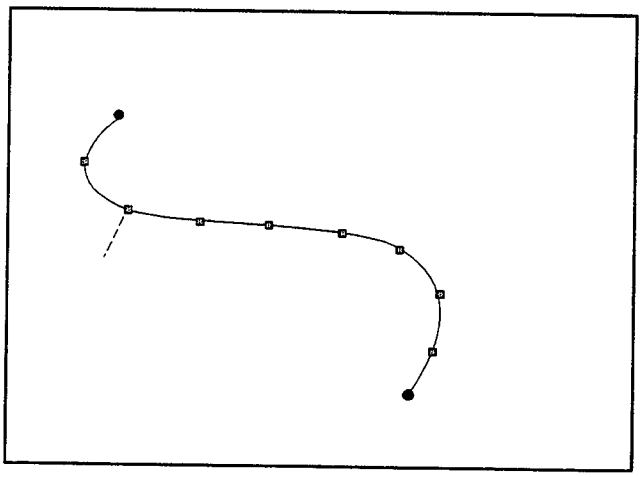
The FIST user interface is written using the ARC/INFO menu language. The interface guides the user through WRU selection and establishing input parameters. It also displays results and assists the user in obtaining hard copy output.

3 FIST Algorithms

Unique algorithms for generating a flood surface and calculating damage were developed specifically for use with the FIST. A detailed description of these algorithms is provided for the generation of the flood surface and calculation of structure, crop, and road damage.

Derivation of Flood Surface

The flood surface is derived using three data sources. These data sources are the river stages, river miles (or interpolated points for water flow), and the digital topographic elevation model of the ground surface within the WRU represented as a regularly spaced data grid.



Using the locations of two gauges and their respective water levels, the relative change in water elevation is first calculated. Then the distance is determined by calculating the total length between the gauges through the river miles or water flow interpolation points. From the relative change in water elevation and distance, the water slope is determined with the assumption that the water slope remains uniform between the gauges. From the water slope, water elevation is calculated at each river mile by using the point-slope form equation.

A preliminary water surface for the WRU is generated for a widely spaced grid file where the water level for each x-y grid point is determined by its closest distance to the water flow interpolation points. This preliminary water level surface is compared with the digital elevation model. If the elevation of the water surface

is greater than or equal to the terrain surface, then that particular point is determined to be flooded. Otherwise, that point is assumed to be not flooded. This method effectively marks all the positions on the land that are below the water level, but does not consider the effects of man-made or natural levees that protect low lands.

To account for the effects of levees on the flood surface, the flow path of the water across the digital elevation model to the main channel is modeled. This is accomplished in the ARC/INFO Grid software by using the function *pathdistance()*. The function *pathdistance()* calculates the path-cost distance over a surface to a set of source points. The set of source points used were the main channel points. The results of *pathdistance()* is a surface where true flooded areas are labeled as zero, and areas protected by levees are labeled with values greater than 1,000. The resulting grid file from *pathdistance()* is compared with the flooded surface, and only the true flooded areas are extracted into the final flooded surface grid.

Calculation of Economic Damage to Structures

Damage estimates to structures are derived using four data sources. These data sources are point data and attributes for the structures, the flood surface elevation, depth-damage curve table for structure content damage, and the depth-damage curve table for the structure damage. The depth-damage tables describe the percent damage of the contents in the structure as well as the damage to the physical structure related to the depth of the water in the structure for several types of structures.

For every structure in the WRU area, the level of the floodwater relative to the first floor of the structure is computed using the floodwater surface elevation at the location of the structure and the first floor elevation. If this relative difference is less than the minimum water level as depicted by the damage tables, the structure is considered to have no damage. Otherwise, the depth of the water in the structure and the type of the structure are used as indices in the damage tables, and the percent damage is determined from the structural damage and contents damage data.

Calculation of Damage to Crops

Damage estimates to crops are derived using the water surface elevation, land-cover grid file, and the crop distribution and damage table. The flood surface elevation is compared against the land cover file, and the flooded cleared land (agricultural) acres are determined and tabulated. For each individual crop type listed in the crop distribution and damage table, the percent flooded of that type is calculated as the percent cover of the crop in cleared land multiplied by the amount of cleared land acres. The area (i.e., acres of crop type flooded) is

multiplied by the per acre damage for that crop type to arrive at the total crop damage value. The total crop damage is calculated similarly for all crop types. The noncrop damage is calculated by applying a per acre damage factor to the flooded cleared land.

Calculation of Damage to Roads

Damage estimates to roads are derived using the digitized road data, flood surface elevation, and per mile road damage table. The digitized road data are compared with the water surface elevation data to determine which sections of the roads are inundated by the floodwater. The length of the section, labeled either paved or unpaved, is tabulated into total length in miles of paved and unpaved roads. The total length of the flooded sections is multiplied by the road damage and is reported as the estimated road damage.

4 Hardware and Software Requirements

FIST requires specialized computer hardware and software for proper system operation. The generation of flood surfaces used for estimating structure and crop damages is computationly intensive and requires a workstation type of system for optimum performance. To achieve this level of performance, the minimum hardware requirements are a UNIX workstation with an 8-bit, 20-in.[1] color graphics monitor, CD-ROM drive, and 1 gigabyte of hard disk space. A Sun Microsystems Sparcstation 20 with 64 megabytes of RAM will satisfy these requirements.

The GIS used in FIST is ESRI ARC/INFO. It allows the complex interactions between the gridded flood surface and point data. ESRI ARC/INFO AML code was utilized for the algorithms in FIST. Because of this, the minimum software requirements are ESRI ARC/INFO 7.0.4, ESRI ArcGrid 7.0.4, and ESRI ArcTin 7.0.4.

The FIST system output requires a high-resolution color graphics printer to adequately depict the calculated flood surface. The suggested requirements for this is a color electrostatic or color laser graphics printer capable of printing on 8.5- by 11.0-in. size paper with a minimum of 200 dots per inch.

[1] A table of factors for converting non-SI units of measurement to SI units is presented on page vi.

5 Database Requirements

The databases delivered with FIST include all the geospatial and nonspatial data required to run FIST. A brief description of each type of data used by FIST is given here.

FIST is designed to use data contained in the GIS database, several look-up tables, and user-supplied parameters. All FIST GIS databases are provided with complete Federal Geographic Data Committee compliant metadata. These metadata are integrated with the ARC/INFO files and are provided as separate text files on the CD-ROMs. The metadata for the residential structure data file in WRU VXD031 are reproduced in Appendix A. The metadata contain complete descriptions of the content and characteristics of each data file.

Elevation

The "elevation" file is a gridded file containing the digital elevation model (DEM). The DEM for each WRU was developed using contours, benchmarks, and surface drainage features digitized from 1:24,000 U.S. Geological Survey (USGS) topographic maps and supplemental field-surveyed elevations. The ARC/INFO routine TOPOGRID was used to interpolate a continuous elevation surface from the contours and point elevations. TOPOGRID uses the information on surface hydrographic features during interpolation to ensure that drainage features are properly represented in the DEM.

The DEM was developed at a spatial resolution of 20 by 20 m. The interpolated elevations were stored as meters above mean sea level. This file is used directly by FIST during the flood surface and economic damage calculations.

Landcover

The "landcover" file is a grid file containing information on cleared, wooded, and urban areas in the WRU. Information on land cover was developed for each WRU by digitizing wooded (forested) and nonwooded areas from 1:24,000 USGS

topographic maps. All green-tinted areas on the USGS maps were manually digitized and coded as wooded. FIST recognizes four land-cover classes. These are cleared, wooded, urban, and other. This file is used directly by FIST in calculation of crop damage.

Residential

The "residential" file contains data on structure location (geographic coordinates) ground and first floor (sill) elevations, description (type), and value of residential structures in each WRU. Structures were surveyed and characterized using several field methods.[1] The value of each structure was estimated using Marshall and Swift Residential Evaluation software.[2] Inputs required by Marshall and Swift (M&S) were recorded during the field survey and are included in the database.

Commercial

The "commercial" file contains data on structure location (geographic coordinates) ground and first floor (sill) elevation, description (type), and value of commercial structures in each WRU. Structures were surveyed and characterized using several field methods.[1] The value of each structure was estimated using Marshall and Swift Commercial Evaluation software.[2] Inputs required by M&S were recorded during the field survey and are included in the database.

Border

The "border" file contains the geographic boundary of the WRU. The WRU boundaries were defined by the Vicksburg District and digitized from 1:24,000 USGS topographic maps. This file is used for graphic display by FIST.

Boundary

The "boundary" file is a grid file indicating the geographic extent of the WRU by the integer value one (1). Locations outside the WRU have a value of zero (0). This file is used directly by FIST when interpolating the flood surface.

---

[1] Hahn, C. H. "Characterization of structures in designated water resource units within the lower Mississippi Basin," Technical Report in preparation, U.S. Army Engineer Waterways Eperiment Station, Vicksburg, MS.

[2] Marshall and Swift. (1993). Residential Cost Program (RE2). Los Angeles, CA.

Rivermiles

The "rivermiles" file is a point coverage containing the location of a series of interpolation points between the upstream and downstream gauges. The points were defined mathematically and are used by FIST during calculation of the flood surface.

Rivermiles.dat

The "rivermiles.dat" file is an ASCII text file containing the x,y coordinates of the interpolation points in "rivermiles." This file is used by FIST during calculation of the flood surface.

Other Files

The ARC/INFO databases delivered with FIST include additional data that were required during database development of software testing. They are not used directly by FIST, but may be useful for additional analysis or other applications. A brief description of these files is given below.

Contours. The "contours" file is a vector line coverage containing elevation contours manually digitized from 1:24,000 USGS topographic maps. These data were used in development of the DEM. They are not used directly by FIST.

Benchmarks. The "benchmarks" file is a vector point coverage containing benchmarks manually digitized from 1:24,000 USGS topographic maps. These data were used in development of the DEM. They are not used directly by FIST.

Streams. The "streams" file is a vector polygon/line coverage containing surface hydrographic features digitized from USGS 1:24,000 topographic maps. These data were used in development of the DEM. They are not used directly by FIST.

Gauges. The "gauges" file is a point coverage containing the geographic coordinates, elevation, name, and ID number of the stream gauges used by FIST for the WRU. This file is not used directly by FIST.

Levees. The "levees" file is a line coverage containing the locations of man-made levees in the WRU. This file was used during development of the DEM. It is not used directly by FIST.

Roads. The "roads" file is a line coverage containing paved and unpaved roads in the WRU. Roads were manually digitized from USGS 1:24,000

topographic maps and updated with field observations. This file is not used directly by FIST.

Shoreline. WRU NOD053 has a "shoreline" file. The file is a line coverage containing the banklines of the Atchafalaya River. This file is unique to this WRU and is not used directly by FIST.

6 Installation of Software and Data

Installation of FIST using the CD-ROM is described below. A typewriter font is used for commands as follows:

```
ls /cdrom/cdrom0
```

FIST Software Installation

The first step is to decide where the FIST software will reside on the computer system hard disk drive. There are no special requirements for the location of the software, except that the software will need at least 2.3 MB of disk space on the computer system. To determine how much free space is available on the computer disk system type the following:

```
df -k
```

Next, set up a directory for the FIST software on the desired disk by using the 'mkdir' command. For example, to set up a directory named '/data2/fist', type the following:

```
mkdir /data2/fist
```

Next, copy the FIST software from the CD-ROM using the cp -r command as follows:

```
cp -r /cdrom/cdrom0/fist/* /data2/fist
```

FIST uses a computer system environment variable named $FISTDIR to determine the location of the FIST software. This variable may be set to the location of the code on the computer disk by typing

```
setenv FISTDIR (FIST directory)
```

or as in the example

```
setenv FISTDIR /data2/fist
```

The FIST system has the following directory structure that contains the program used during execution.

Directory Name	Description and Contents
/amls	ARC/INFO AMLs used for damage calculations
/bin	Executable programs
/menus	ARC/INFO menus
/misc	ARC/INFO fonts and shadesets for FIST
/src	C language source code for flood surface generation
/tables	Default depth damage tables
/templates	Map templates used for FIST output

After the environment variable has been set, the file will need to be edited by typing the command:

```
cd $FISTDIR/bin
```

and editing the file named '`fist`'. A text editor such as `vi` or `nedit` can be used to edit this file. In this file, the assignment statement needs to be changed in lines 11 and 12. On line 11, the assignment statement for the `FISTDIR` environment variable should be modified to reflect the location of the FIST software. On line 12, the assignment statement for the `DBASEDIR` environment variable should be modified to reflect the location of the ARC/ INFO data coverages of the WRUs. These two lines should look somewhat like the following:

```
setenv FISTDIR /cdrom/cdrom0/fist
setenv DBASEDIR /dta3/fdes
```

Appropriate changes can be made using the editor. This file called '`fist`' will be the executable code that initiates the FIST software.

To complete the installation, the UNIX path variable should be modified to check in the FIST executable directory by typing the following:

```
set path = ( $path $FISTDIR/bin )
```

or as in the example:

```
set path = ( $path /data2/fist/bin )
```

The `.cshrc` file in the user's home directory should be modified to include the above command.

Data Installation

FIST is designed to generate damage calculations using the WRU data residing on the computer disk or from the data provided on the CD-ROM media. The WRU data must be placed on the users hard disk. This can be accomplished by changing the following line in the program as follows `$FISTDIR/bin/fist`:

```
setenv DBASEDIR /location_of_wru_directories
```

where *`location_of_wru_directories`* is a directory name, or if the WRU data are on the CDROM media:

```
setenv DBASEDIR /cdrom/cdrom0
```

This variable indicates where the ARC/INFO work spaces for the WRU data are located. If it is necessary to copy the WRU data from the CD-ROM, use the following:

```
mkdir /location_of_wru_directories/wru_name
cd /location_of_wru_directories/wru_name
cp -r /cdrom/cdrom0/wru_name
```

where *`wru_name`* is the name of the WRU.

7 FIST Operation

The FIST contains a graphical menu interface with a graphic display that requires inputs from the user. The following text will describe the operation of the interface and user inputs and will provide examples of its operation.

Generating Damage Estimates

This first step generates damage estimates from a flood surface and detailed information on the inputs required.

a. To begin operation of the FIST, the user will need to change his current working directory to one where the calculations will be made. It is recommended that separate directories be used for damage estimates for each different WRU. Once this is done, type `'fist'` at the UNIX prompt. This command will begin several processes. First, the system will check and see if the current directory is a valid ARC/INFO work space; if not, the directory will be modified accordingly. Second, the system checks for the existence of two files, `content.txt` and `struct.txt`. These are the depth damage curve tables as described in Appendix B. If the files are not found, then the default files from `$FISTDIR/tables` will be retrieved and used during damage estimates. Next, ARC/INFO is started and a graphic display window and a "push-button" menu will be displayed on the screen as shown in Figure 2. (Note the date is the FIST Run date.) The push-button menu provides choices for the FIST. The first set of buttons labeled for the WRU names allows the user to select the WRU for calculations. Currently, there are four WRUs (Vicksburg 031 and 046 and New Orleans 038 and 053) for use with FIST. The button labeled "Draw Maps" displays previously calculated maps on the graphic monitor or sends the maps to a plotter. This button is explained in more detail in the section "Drawing Maps." The button labeled "Quit" allows the user to exit from the FIST.

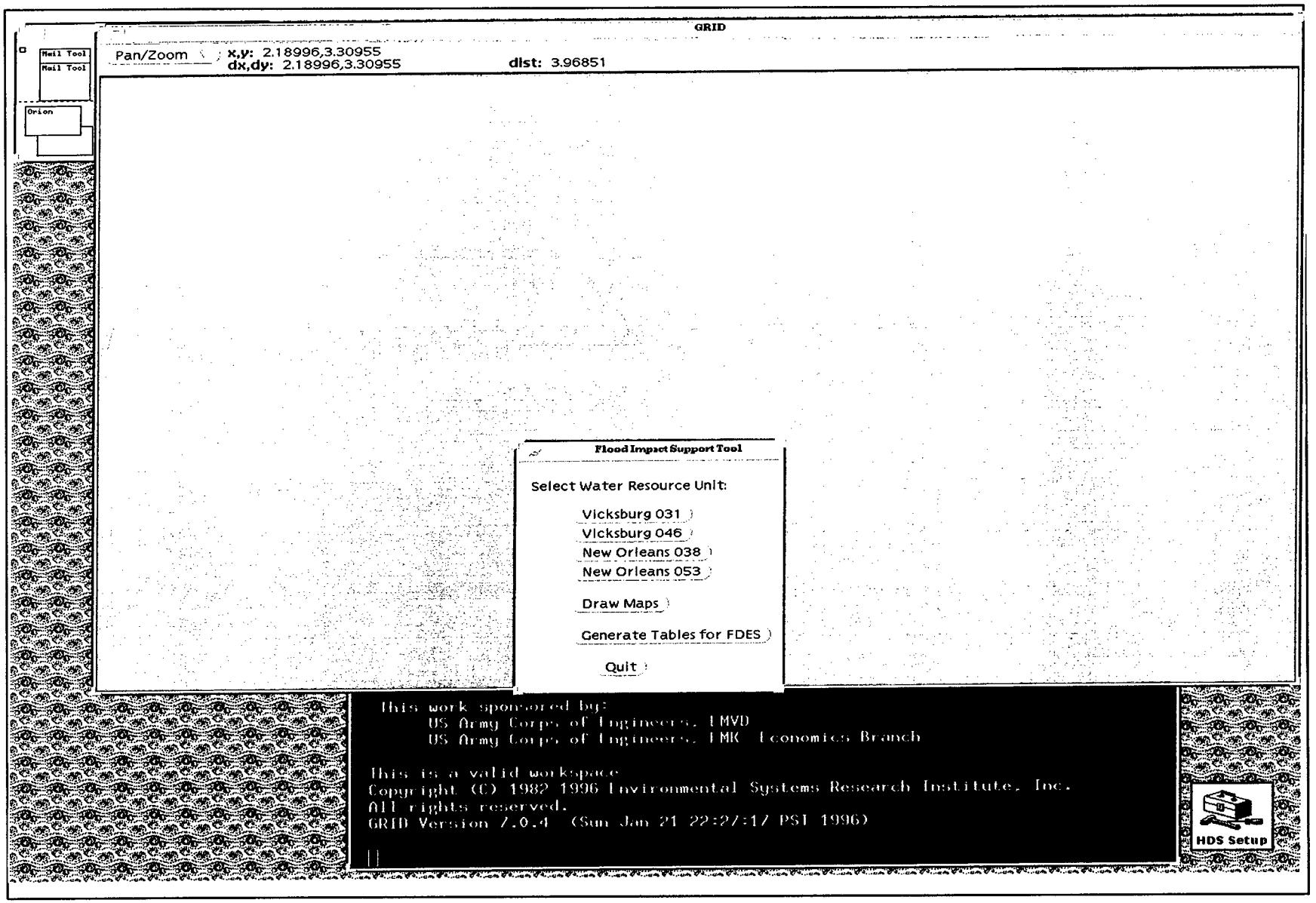


Figure 2. Initial FIST user interface display

b. Select the button labeled "Vicksburg 031" by moving the mouse pointer to the button label and clicking the left mouse button one time. Once this is done, the menu will disappear and will be replaced with another menu for the Vicksburg District WRU 031 inputs. This menu contains upstream and downstream gauge data and crop damage table ID. The graphic monitor will display the land-use map for the WRU selected and a location map for the WRU within the District as shown in Figure 3.

   The stage data is entered by clicking the left mouse button on the entry gauge blank in the menu for the WRU inputs, typing in the stage number in feet, and pressing the return key. For example, using the Vicksburg District WRU 031, the reported stages of 49.52 ft and 55 ft for the gauges at Natchez and Knox Landing, respectively, are entered as shown in Figure 3. Notice that the Natchez gauge is labeled as the reference gauge of the WRU; this reference gauge number will be used as a future reference to stored damage calculations.

c. The third input is the name of the crop damage table. This crop damage table is used to calculate the damage of flooding on cleared land with different types of crops. This table is an ASCII fixed format table whose format is described in detail in Appendix B. An example crop damage table is shown in Table 1 and is used for the demonstration example and stored in the file name `crop_damage.txt`. The contents of this input (table) shows that there are three crop types— soybeans, cotton, and corn as indicated by the second column of the data file. By entering the name of the crop damage table in the menu and then clicking on the "Edit table" button, the FIST interface will open a new window. The vi editor can be used to modify the values of the table.

Once all entries are inputted and checked, then the FIST interface allows the user to click on the button labeled "Run damage calculations." This will initiate the calculations. If damage calculations are selected and the input values are valid, the graphics monitor will display the input values and generate a flood surface and water damage estimates. Once a flood surface is calculated, the FIST interface will display damage estimates on the graphics monitor. The first set of numbers will be the estimated number of acres inundated by the simulated flood event categorized by the four classes, cleared land (agricultural), wooded land, urban, and other. The other category represents the water areas within the WRU. The second set of numbers are the crop damage estimates. The three columns depict the types of crops, number of acres inundated, and estimated damage to the crop. The FIST interface calculates the (economic) damage for all the residential and commercial structures that are located in the WRU. An example of the above estimates for WRU VXD031 is shown in Figure 4. Once this is completed, the user may then use the **Return** button to return to the main FIST interface menu.

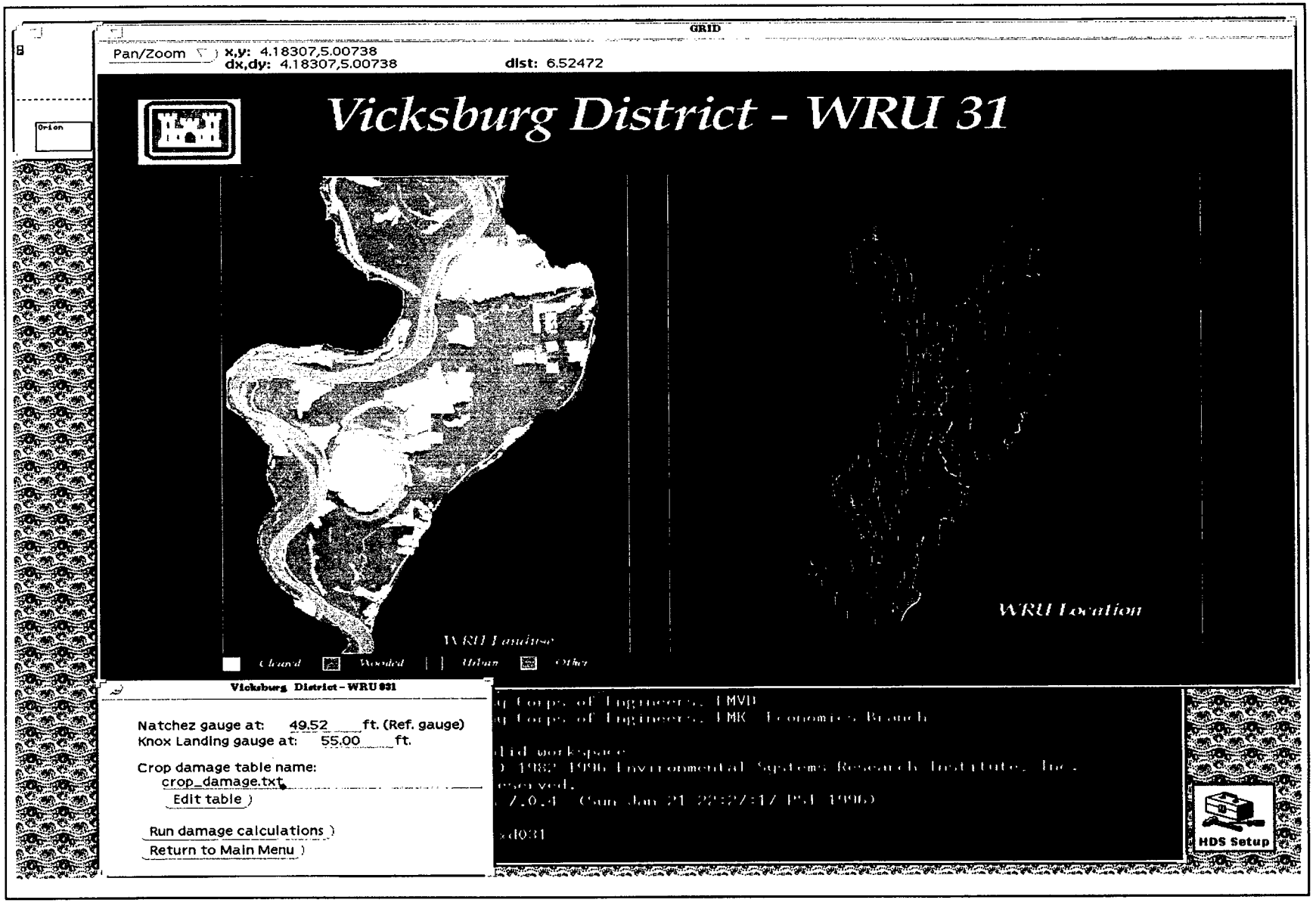


Figure 3. Display for WRU Vicksburg District 031

Table 1. Contents of an Example Crop Damage Table

8 crop types

crop type	percent of cleared flooded	percent of cleared not flooded	per acre loss ($)
Soybeans	5	5	0.00
Cotton	90	90	181.00
Wheat	0	0	0.00
Corn	5	5	90.00
Sorghum	0	0	0.00
Rice	0	0	0.00
Pasture	0	0	0.00
Catfish	0	0	0.00
Noncrop			30.00

	per mile loss ($)
Paved Roads	5000.00
Unpaved Roads	2000.00

Generating the Maps

The FIST interface can be used to display the results of damage estimates for the flood. Results are stored within the INFO database. To retrieve and display the results, the user must first select the Draw Maps button from the main FIST interface menu as shown in Figure 2 by moving the mouse pointer to the button label and clicking the left mouse button. When this is done, a menu named FIST Map Generation is displayed. On this menu, a range of available flood surface elevations will be displayed as shown in Figure 5. Select one of these elevations by moving the scroll bar with the mouse pointer, then select one by clicking once with the left mouse button. On the lower right corner of the menu, you may either select to have the output go to the plot file or be sent to the graphics monitor. In the example, maps were displayed on the graphics monitor. To begin map generation, click the mouse on the Generate Maps button. The graphics display will then display the first map, from a series of four, that shows the flooded land cover and estimated acres inundated (Figure 6). On the right side of the monitor, a menu with one button will be displayed that will continue generating the maps when clicked with the mouse. The second map will show the cleared flooded land and the estimated crop damages generated from the input crop damage table in the previous section. A click on the button (in the menu) will take you to the next map. The third map shows the number and location of all the flooded and non-flooded structures and their combined estimated damage. The next map (Figure 7) is the summary of all the damage estimates along with the spatial distribution of the flood extent. The menu named FIST Map Generation is now displayed on the screen, and the user may then either select another flood surface elevation (for map calculation/generation) or exit and return to the main FIST menu.

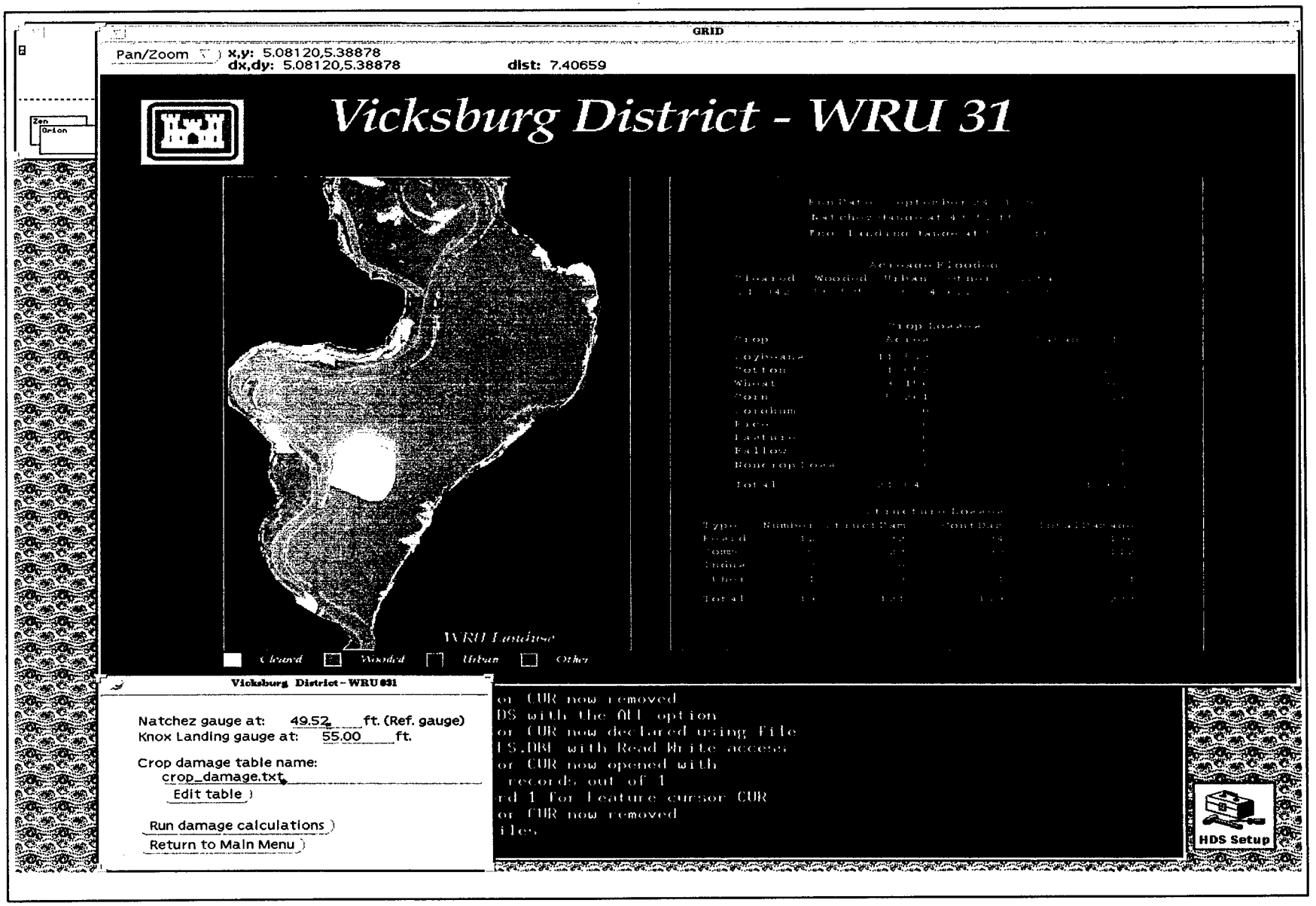


Figure 4. Economic damage estimates for WRU VXD031

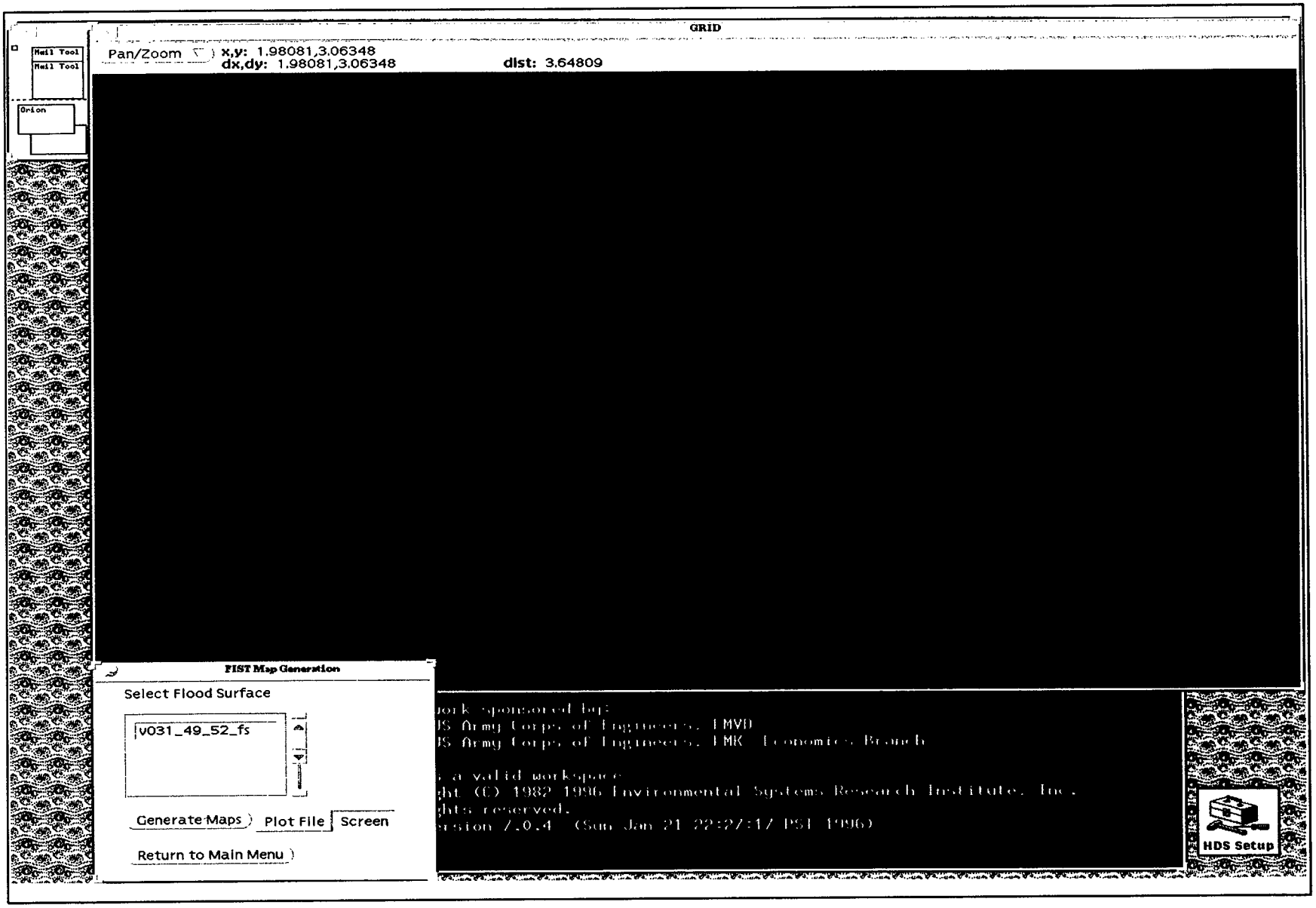


Figure 5. FIST user interface for generating maps

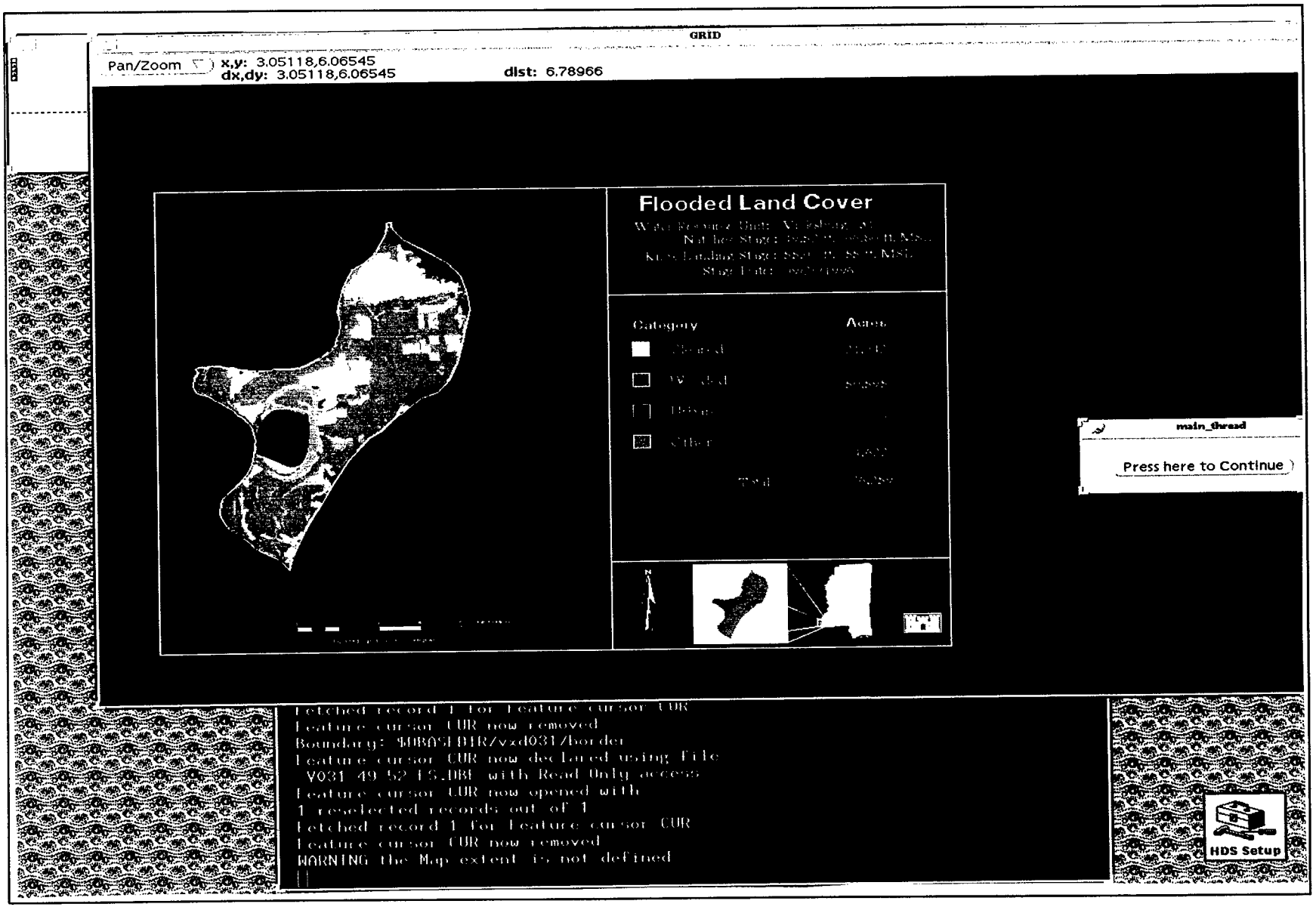


Figure 6. Example of flooded land cover map for VXD031

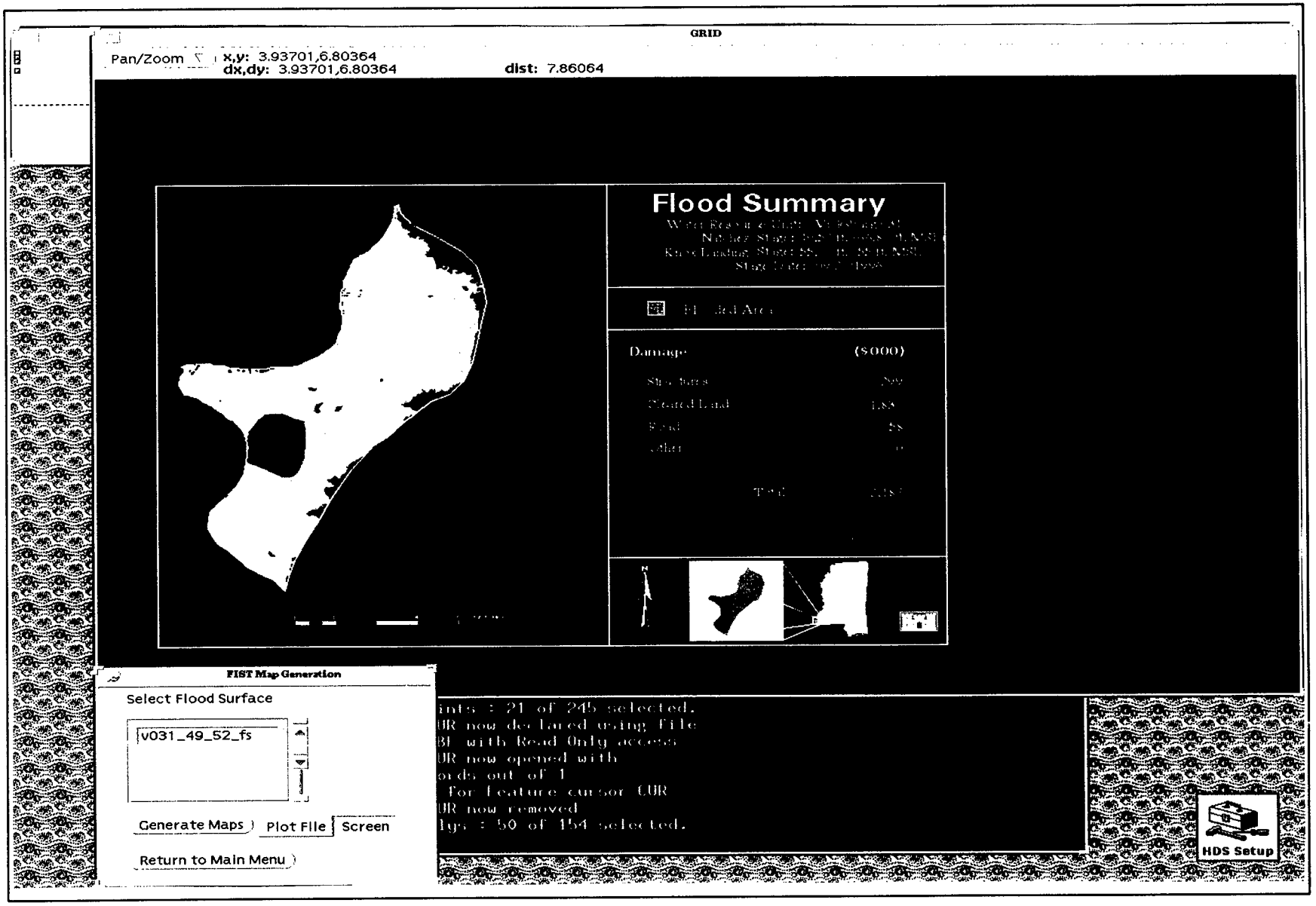


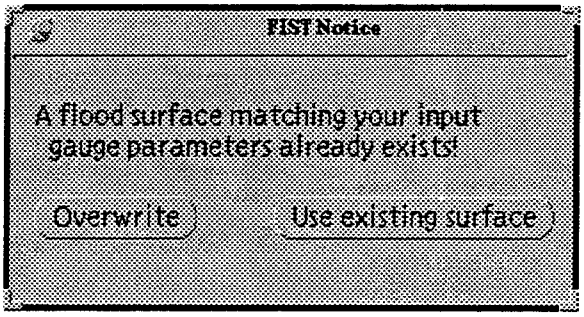
Figure 7. Example of flood summary map for VXD031

If the user selects to plot the maps, the FIST will generate four plot files corresponding to the four maps. The plot files will be similarly named to their corresponding flood surface. In the example shown, the flood surface is named v031_49_52_fs for the reported stage of 49.52 ft. at the Natchez gauge and the corresponding plot files will be named v031_49_52_cl.gra, v031_49_52_fl.gra, v031_49_52_sc.gra, and v031_49_52_sm.gra for the flooded cleared land map, flooded land cover map, flooded structures map, and flood summary map, respectively. Examples of these maps are shown in Appendix C.

Using an Existing Surface

The FIST system maintains a database containing information for previously generated damage estimates and flood surfaces. These surfaces can be reused assuming no changes have occurred. This database allows FIST to retrieve the stages, date of simulation, and damage values. As a result, the user may use the same flood surface several times, thus saving time from needless computations for the same surface. This database feature is activated when the user selects the WRU, inputs the upstream and downstream gauge data, and elects to run damage calculations as shown in Figure 3. The database is searched for the existence of a flood surface that matches the input parameters. If none is found, a new flood surface is generated; otherwise, the user will see a menu popup with the following:

The user may decide to overwrite the flood surface or use the existing surface in the directory that matches the stage inputs.



Using an Existing Surface from CD-ROM

The CD-ROMs contain calculated flood surfaces that represent realistic water stage readings for each WRU. The user may use these surfaces by copying the desired surface in the working directory by using the ARC/ INFO copy command. Once accomplished, the user will need to run the AML$FISTDIR/amls/ update.aml. This AML will update the FIST database with the parameters of the flood surface. Next, the user will need to exit ARC/INFO, start the FIST system normally, and use the operational procedure as described in the previous section.

Damage Estimates for FDES

Custom software was developed to allow FIST output to be reformatted for use with the existing Flood Damage Estimation System (FDES), a nongraphic based assessment tool currently in use by the Vicksburg District. After completing all economic damage calculations for the range of stages specified by the FDES in the FIST system, the Generate Tables for FDES selection on the menu reformats FIST output into three text tables that can be imported directly into FDES.

Tabular output by the FIST system for WRU VXD031 is shown in Tables 2-4. Table 2 is the example data for the file named `wedtsc.txt` which contains, for a range of stage elevations in WRU VXD031, dollar damages to residences, public buildings, industrial buildings, commercial buildings, and roads. Table 3 shows data for the file named `wensc.txt` which contains, for a range of stage elevations, the number and value estimates for residential, commercial, industrial, and public structures in WRU VXD031. The number of acres inundated for four land-cover types for a range of stages in file `wstga.txt` for WRU VXD031 is shown in Table 4.

Table 2. (wedtsc.txt) Accumulative Dollar Damages for WRU VXD031

DIS	WRU	KIND	NAME	ELEV	POP	RES	COMM	INDUST	PUBLIC	FARM	ROAD	TOTAL
VXD	31	Rural	EDR	43.0	0	0	0	0	0	0	0	0
VXD	31	Rural	EDR	44.0	0	0	0	0	0	0	0	0
VXD	31	Rural	EDR	45.0	0	0	0	0	0	0	0	0
VXD	31	Rural	EDR	46.0	0	0	0	0	0	0	0	0
VXD	31	Rural	EDR	47.0	0	1	0	0	0	0	0	1
VXD	31	Rural	EDR	48.0	0	6	0	0	0	0	0	6
VXD	31	Rural	EDR	49.0	0	9	16	0	0	0	0	25
VXD	31	Rural	EDR	50.0	0	28	36	0	0	0	0	64
VXD	31	Rural	EDR	51.0	0	65	73	0	0	0	0	138
VXD	31	Rural	EDR	52.0	0	88	92	0	0	0	0	180
VXD	31	Rural	EDR	53.0	0	118	106	0	1	0	0	225
VXD	31	Rural	EDR	54.0	0	156	115	0	1	0	0	272
VXD	31	Rural	EDR	55.0	0	186	123	0	1	0	0	310
VXD	31	Rural	EDR	56.0	0	237	129	0	1	0	0	367
VXD	31	Rural	EDR	57.0	0	343	133	0	1	0	0	477
VXD	31	Rural	EDR	58.0	0	589	140	0	1	0	0	730
VXD	31	Rural	EDR	59.0	0	842	166	0	3	0	0	1011
VXD	31	Rural	EDR	60.0	0	1160	191	0	4	0	0	1355
VXD	31	Rural	EDR	61.0	0	1515	211	0	5	0	0	1731
VXD	31	Rural	EDR	62.0	0	1989	226	0	7	0	0	2222
VXD	31	Rural	EDR	63.0	0	2589	238	0	16	0	0	2843
VXD	31	Rural	EDR	64.0	0	3356	244	0	25	0	0	3625
VXD	31	Rural	EDR	65.0	0	4170	247	0	32	0	0	4449
VXD	31	Rural	EDR	66.0	0	4964	251	0	37	0	0	5252
VXD	31	Rural	EDR	67.0	0	5678	255	0	42	0	0	5975
VXD	31	Rural	EDR	68.0	0	6276	259	0	44	0	0	6579
VXD	31	Rural	EDR	69.0	0	6929	263	0	52	0	0	7244
VXD	31	Rural	EDR	70.0	0	7385	267	0	57	0	0	7709
VXD	31	Rural	EDR	71.0	0	7788	270	0	61	0	0	8119
VXD	31	Rural	EDR	72.0	0	8109	272	0	65	0	0	8446
VXD	31	Rural	EDR	73.0	0	8330	272	0	68	0	0	8670
VXD	31	Rural	EDR	74.0	0	8478	272	0	70	0	0	8820
VXD	31	Rural	EDR	75.0	0	8588	272	0	73	0	0	8933

Table 3. (wensc.txt) Accumulative Dollar Values ($1,000) of Structures in WRU VXD031

DIS	WRU	KIND	NAME	ELEV	RESNO	RESVAL	COMMN	COMMVA	INDUSTNO	INDUSTVAL	PUBLICNO	PUBLICVA	STORNO	STORVAL
VXD	31	Rural	ENR	43.0	0	0	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	44.0	0	0	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	45.0	0	0	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	46.0	0	0	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	47.0	1	10	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	48.0	1	10	0	0	0	0	0	0	0	0
VXD	31	Rural	ENR	49.0	1	10	2	64	0	0	1	1	0	0
VXD	31	Rural	ENR	50.0	5	101	3	86	0	0	1	1	0	0
VXD	31	Rural	ENR	51.0	5	101	4	134	0	0	1	1	0	0
VXD	31	Rural	ENR	52.0	7	153	4	134	0	0	1	1	0	0
VXD	31	Rural	ENR	53.0	8	168	4	134	0	0	1	1	0	0
VXD	31	Rural	ENR	54.0	10	183	4	134	0	0	1	1	0	0
VXD	31	Rural	ENR	55.0	13	237	5	135	0	0	1	1	0	0
VXD	31	Rural	ENR	56.0	25	522	5	135	0	0	1	1	0	0
VXD	31	Rural	ENR	57.0	38	737	7	138	0	0	1	1	0	0
VXD	31	Rural	ENR	58.0	52	1123	9	140	0	0	1	1	0	0
VXD	31	Rural	ENR	59.0	58	1258	13	224	0	0	2	7	0	0
VXD	31	Rural	ENR	60.0	69	1608	13	224	0	0	2	7	0	0
VXD	31	Rural	ENR	61.0	83	2079	14	226	0	0	3	12	0	0
VXD	31	Rural	ENR	62.0	103	2680	14	226	0	0	3	12	0	0
VXD	31	Rural	ENR	63.0	133	3530	14	226	0	0	4	47	0	0
VXD	31	Rural	ENR	64.0	148	4123	15	227	0	0	5	48	0	0
VXD	31	Rural	ENR	65.0	165	4665	15	227	0	0	5	48	0	0
VXD	31	Rural	ENR	66.0	179	5079	15	227	0	0	5	48	0	0
VXD	31	Rural	ENR	67.0	186	5315	15	227	0	0	5	48	0	0
VXD	31	Rural	ENR	68.0	197	5750	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	69.0	204	5920	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	70.0	209	6047	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	71.0	212	6139	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	72.0	212	6139	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	73.0	213	6147	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	74.0	214	6167	15	227	0	0	6	65	0	0
VXD	31	Rural	ENR	75.0	215	6190	15	227	0	0	6	65	0	0

Table 4. (wstga.txt) Acres Inundated for WRU VXD031

DIS	WRU	ELEV	URBAN	CLEARED	WOODED	OTHER	TOTAL
VXD	31	43.0	0	3110	16877	2993	22980
VXD	31	44.0	0	7914	44104	6658	58676
VXD	31	45.0	0	15673	79396	10448	105517
VXD	31	46.0	0	25051	118435	14360	157846
VXD	31	47.0	0	34907	159114	18322	212343
VXD	31	48.0	0	51216	202574	22379	276169
VXD	31	49.0	0	68844	248372	26672	343888
VXD	31	50.0	0	87156	296189	31121	414466
VXD	31	51.0	0	106391	344908	35597	486896
VXD	31	52.0	0	131016	394335	40236	565587
VXD	31	53.0	0	156405	444383	44921	645709
VXD	31	54.0	0	182310	495059	49708	727077
VXD	31	55.0	0	208412	546216	54517	809145
VXD	31	56.0	0	234675	597649	59341	891665
VXD	31	57.0	0	261083	649175	64185	974443
VXD	31	58.0	0	287634	700778	69034	1057446
VXD	31	59.0	0	314358	752490	73887	1140735
VXD	31	60.0	0	341273	804312	78752	1224337
VXD	31	61.0	0	368245	856229	83626	1308100
VXD	31	62.0	0	395277	908190	88524	1391991
VXD	31	63.0	0	422443	960287	93422	1476152
VXD	31	64.0	0	449692	1012419	98321	1560432
VXD	31	65.0	0	476990	1064613	103220	1644823
VXD	31	66.0	0	504310	1116820	108119	1729249
VXD	31	67.0	0	531649	1169043	113018	1813710
VXD	31	68.0	0	559014	1221275	117917	1898206
VXD	31	69.0	0	586394	1273517	122816	1982727
VXD	31	70.0	0	613786	1325767	127715	2067268
VXD	31	71.0	0	641187	1378032	132614	2151833
VXD	31	72.0	0	668596	1430308	137513	2236417
VXD	31	73.0	0	696012	1482608	142413	2321033
VXD	31	74.0	0	723448	1534929	147313	2405690
VXD	31	75.0	0	750912	1587273	152213	2490398

Appendix A
Metadata for Water Resource Unit VXD031

The following is the metadata documentation for the residential structures located in Water Resource Unit VXD031. Additional metadata are available for the data on the distribution CD-ROMs located in the directory named `metadata`.

```
FGDC-Compliant Metadata for RESIDENTIAL

Identification_Information:
  Citation:
    Originator: USACE Waterways Experiment Station
    Publication_Date: unpublished
    Publication_Time:
    Title: Residential
    Edition:
    Geospatial_Data_Presentation_Form: map
    Series_Information:
      Series_Name:
      Issue_Identification:
    Publication_Information:
      Publication_Place:
      Publisher:
    Other_Citation_Details:
    Online_Linkage:
    Larger_Work_Citation:

  Description:  Vicksburg District Water Resource Unit # 31 Residential
                structures
    Abstract:
     This data set is a point coverage of residential structures
     located within the U.S. Army Corps of Engineers (USACE)
     Vicksburg District Water Resource Unit (WRU) 31.


    Purpose:

      Intended use of data
         These residential points were surveyed to be used
         in generating a flood damage estimate for Water
         Resource Unit 31.


    Supplemental_Information:

      Structure locations, elevations, and ground elevations were
      determined by a combination of Global Positioning Survey (GPS)
```

and traditional field survey techniques. Structure values were computerized using Marshall and Swift Evaluator.

Revisions made to data
None planned.

Reviews applied to data

Related spatial and tabular data sets and programs

References cited
Marshall and Swift Evaluator.

Notes

Time_Period_of_content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 1995
Ending_Date: Present
Currentness_Reference: Publication date of sources

Status:
Progress: Complete
Maintenance_and_Update_Frequency: Unknown

Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -91.5716
East_Bounding_Coordinate: -91.4653
North_Bounding_Coordinate: 31.2382
South_Bounding_Coordinate: 31.0822
Data_Set_G-Polygon:
Data_Set_G-Polygon_Outer G-Ring:

Keywords:
Theme:
Theme_Keyword_Thesaurus: none
Theme_Keyword: Residential
Place:
Place_Keyword_Thesaurus: none
Place_Keyword: Southwest Mississippi, Lake Mary, WRU31
Stratum:
Stratum_Keyword_Thesaurus: none
Stratum_Keyword:
Temporal:
Temporal_Keyword_Thesaurus: none
Temporal_Keyword:

Access_Constraints: none

Use_Restrictions:
These data were compiled for government use and represent the results of data collecting/processing for a specific U.S. Army Corps of Engineers (USACE) activity. The USACE makes no representation as to the suitability or accuracy of these data for any other purpose and disclaims any liability for errors that the data may contain. As such, it is only valid for its intended use, content, time, and accuracy specifications. While there are no explicit constraints on the use of the data, please exercise appropriate and professional judgement in the use and interpretation of these data.

Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact Person: Rayford Wilbanks (CELMK-PD-E)
Contact_Organization: USACE Vicksburg District

```
    Contact_Address:
      Address_Type: mailing and physical address
      Address: 2101 North Frontage Road
      City: Vicksburg
      State_or_Province: Mississippi
      Postal_Code: 39180-5191
      Country: USA
    Contact_Voice_Telephone: (601) 631-5463
    Hours_of_Service: 8:00am - 4:30pm ct  Monday thru Friday
    Contact_Instructions: Planning Division


Security_Information:
  Security_Classification_System:
  Security_Classification:  UNCLASSIFIED
  Security_Handling_Description:

Native_Data_Set_Environment: unix

Cross_Reference:
  Originator: Unknown
  Publication_Date:
  Publication_Time:
  Title:
  Edition:
  Geospatial_Data_Presentation_Form: map
  Series_Information:
    Series_Name:
    Issue_Identification:
  Publication_Information:
    Publication_Place:
    Publisher:
  Other_Citation_Details:
  Online_Linkage:
  Larger_Work_Citation:

Data_Quality_Information:

Attribute_Accuracy:
  Attribute_Accuracy_Report:  See Entity_Attribute_Information
  Quantitative_Attribute_Accuracy_Assessment:
    Attribute_Accuracy_Value:  See Explanation
    Attribute_Accuracy_Explanation:
      Attribute accuracy is described, where present, with each
      attribute defined in the Entity and Attribute Section.

Logical_Consistency_Report:  Point features present.

Completeness_Report:  See Data Set Description Section

Positional_Accuracy:
  Horizontal_Positional_Accuracy:
    Horizontal_Positional_Accuracy_Report:
    Quantitative_Horizontal_Positional_Accuracy_Assessment:
  Horizontal_Positional_Accuracy_Value:
    Horizontal_Positional_Accuracy_Explanation:  Resolution as reported

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method:  Point

Point_and_Vector_Object_Information:
  SDTS_Terms_Description:
    SDTS_Point_and_Vector_Object_Type:  Point
      Point_and_Vector_Object_Count:  223
    SDTS_Point_and_Vector_Object_Type:  String
      Point_and_Vector_Object_Count:  0
    SDTS_Point_and_Vector_Object_Type:  GT-polygon composed of chains
      Point_and_Vector_Object_Count:  0

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
  Horizontal_Coordinate_System: Grid
```

```
Grid_Coordinate_System_Name: UTM
Planar_Distance_Units: METERS
Zone_Number: 15
          Horizontal_Datum_Name:  NAD83
          Ellipsoid_Name:  GRS1980
          X-Shift:  0.0000000000
          Y-Shift:  0.0000000000

Entity_Attribute_Information:
  Detailed_Description:
    Number_of_Attributes_in_Entity:  37
    Entity_Type:
      Entity_Type_label:  ' '
      Entity_Type_Definition:  Point Attribute Table
      Entity_Type_Definition_Source:  Field Survey using GPS.
    Attribute:
      Attribute_Label:  -
      Attribute_Definition:  Point Attribute Table
      Attribute_Definition_Source:  Field Survey using GPS.
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  -
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  AREA
      Attribute_Definition:  Degenerate area of point
      Attribute_Definition_Source:  Assigned
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  '0'
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  PERIMETER
      Attribute_Definition:  Degenerate perimeter of point
      Attribute_Definition_Source:  Assigned
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  '0'
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  RESIDENTIAL#
      Attribute_Definition:  Internal feature number
      Attribute_Definition_Source:  Computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Sequential unique positive integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  RESIDENTIAL-ID
      Attribute_Definition:  User-assigned feature number
      Attribute_Definition_Source:  User-defined
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  ID_NUMBER
      Attribute_Definition:  Structure Survey ID#
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  GROUND_ELEV
      Attribute_Definition:  Surveyed ground elevation in meters
      Attribute_Definition_Source:  Field survey using GPS
```

```
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Floating Point elevation
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  FRSTFLR_ELEV
      Attribute_Definition:  Elevation of the First floor for the
commercial structure
      Attribute_Definition_Source:  Field survey using GPS
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Floating Point elevation
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  GROUND_FT
      Attribute_Definition:  Ground elevation calculated in feet
      Attribute_Definition_Source:  calculated
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Floating point elevation
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  FRSTFLR_FT
      Attribute_Definition:  First floor elevation calculated in feet
      Attribute_Definition_Source:  calculated
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Floating point elevation
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  SURVEY_POINT
      Attribute_Definition:  Survey instrumentation ID
      Attribute_Definition_Source:  assigned
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  NUMBER
      Attribute_Definition:  Structure Number
      Attribute_Definition_Source:  assigned
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  SQUARE_FOOT
      Attribute_Definition:  Total estimated area of this structure in
square feet
      Attribute_Definition_Source:  Field survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  TYPE
      Attribute_Definition:  Type of home
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  STRUCT_CODE
      Attribute_Definition:  Structure Construction Type
      Attribute_Definition_Source:  assigned
```

```
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  A, B, S, D
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  QUALITY
      Attribute_Definition:  Quality of condition of the structure.
      Attribute_Definition_Source:  Field survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Excellent, Good, Average, Fair, Poor
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  QUALITY_CODE
      Attribute_Definition:  Code given for the structures condition and
quality
      Attribute_Definition_Source:  Field Survey Observations
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  1, 2, 3, 4, 5
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  EFFECTIVE_AGE
      Attribute_Definition:  The structure's age in years
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  CONDITION
      Attribute_Definition:  Quality and Condition of the structure
      Attribute_Definition_Source:  Computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Worn Out, Badly Worn, Average
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  COND_CODE
      Attribute_Definition:  Code given based on quality and condition of
the structure.
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  1, 2, 3
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  STYLE
      Attribute_Definition:  Style of the Structure
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  One Story, Two Story
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  STYLE_CODE
      Attribute_Definition:  Code defining structure style
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  1, 2
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  HEAT_COOLING
```

```
      Attribute_Definition:  Type of heating and/or cooling system the
structure has.
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Warmed and Cooled Air
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  HEAT_CODE
      Attribute_Definition:  Code given to describe type of heating and/or
cooling system
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  EXT_WALL
      Attribute_Definition:  Type of exterior walls of the structure.
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Plywood, Siding, Common Brick
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  WALL_CODE
      Attribute_Definition:  Code given for the type of exterior wall of
the structure
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  ROOF
      Attribute_Definition:  Type of roof of the structure
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Composition Shingle, Galvanized Metal
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  ROOF_CODE
      Attribute_Definition:  Code given for type of roof the structure has.
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  FIREPLACE
      Attribute_Definition:  Number of Fireplaces in structure
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  GARAGE_TYPE
      Attribute_Definition:  Number and type of garages present in this
structure
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  None, SF-Attached,
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
```

```
    Attribute:
      Attribute_Label:  GARAGE_CODE
      Attribute_Definition:  Code given to type of garage present in the
structure
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  COMMENT
      Attribute_Definition:  Any comment that may be beneficial to the
surveyed structure
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  character
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  ROLL
      Attribute_Definition:  Roll of film structure located on
      Attribute_Definition_Source:  Field Survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  FRAME
      Attribute_Definition:  Frame of film structure is located on
      Attribute_Definition_Source:  Field survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  PRINT
      Attribute_Definition:  Print of film the structure was located on
      Attribute_Definition_Source:  Field survey
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  VALUE
      Attribute_Definition:  Estimated Value of Structure
      Attribute_Definition_Source:  Marshall and Swift
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown
    Attribute:
      Attribute_Label:  S_TYPE
      Attribute_Definition:  Structure Type
      Attribute_Definition_Source:  computed
        Attribute_Domain_Values:
          Enumerated_Domain:
            Enumerated_Domain_Value:  Integer
        Attribute_Value_Accuracy_Information:
        Attribute_Measurement_Frequency:  Unknown

  Overview_Description:
    Entity_and_Attribute_Overview:


    Entity_and_Attribute_Detail_Citation: Not Available
```

```
Distribution_Information:
  Distributor:
    Contact_Information:
    Contact_Person_Primary:
        Contact_Person: Rayford Wilbanks (CELMK-PD-E)
        Contact_Organization: USACE Vicksburg District
      Contact_Address:
        Address_Type: mailing and physical address
        Address: 2101 North Frontage Road
        City: Vicksburg
        State_or_Province: Mississippi
        Postal_Code: 39180-5191
        Country: USA
      Contact_Voice_Telephone: (601) 631-5463
      Hours_of_Service: 8:00am - 4:30pm ct  Monday thru Friday
      Contact_Instructions: Planning Division
  Resource_Description: Water Resource Unit  New Orleans District 38
  Standard_Ordering_Process:

  Custom_Order_Process: No custom orders processed
  Technical_Prerequistes: Arc/Export conversion software required
  Available_Time_Period:
    Beginning_Date/Time: 19960301
    Ending_Date/Time: Present

Metadata_Reference_Section:
  Metadata_Date: 19960229
  Metadata_Contact: lord
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial
Metadata
  Metadata_Standard_Version:  19940608
  Metadata_Time_Convention:  Local Time
  Metadata_Security_Information:
    Metadata_Security_Classification_System:  None
    Metadata_Security_Classification:  UNCLASSIFIED
    Metadata_Security_Handling_Description:  None
```

Appendix B
Data Formats

These are the format specifications for the input ASCII digital data used in FIST for the water resource unit (WRU) data.

Crop Distribution Table

The FIST system uses an input digital data file to describe the crop distributions within an individual WRU. An example of this data file is provided in Figure B1. A text description of this data file is as follows:

line 1: Number of crop types
line 2: BLANK
lines 3 - 6: Header Lines
lines 6 - *n* crop types: Crop Distribution Data Values (crop type, percent flooded, percent not flooded, per acre loss)

The following FORTRAN format statements describe the data values format:

FORMAT(A10,8x,I2,18X,I2,18X,F8.2)

lines *n* + 1: BLANK
lines *n* + 2: Noncrop Values (FORMAT(A10,38X,F8.2))
lines *n* + 3 - n + 7: Header Lines
lines *n* + 8: Paved Road Values (FORMAT(A10,38X,F8.2))
lines *n* + 9: Unpaved Road Values (FORMAT(A10,38X,F8.2))

The total values for the crop distribution of percent flooded and percent not flooded must each total 100 percent. If the totals are less than or over 100 percent the resulting crop damage estimates will be incorrect.

```
8 crop types

crop        percent of          percent of              per acre
type      cleared flooded     cleared not flooded        loss ($)
====      ===============     ===================        =========

Soybeans          55                  55                    0.00
Cotton             5                   5                  220.00
Wheat             15                  15                  275.00
Corn              25                  25                  119.00
Sorghum            0                   0                    0.00
Rice               0                   0                    0.00
Pasture            0                   0                    0.00
Fallow             0                   0                    0.00

Noncrop                                                     5.00

                                                         per mile
                                                          loss ($)

Paved Roads                                              2000.00
Unpaved Roads                                             500.00
```

Figure B1. Example crop distribution table

Structure Depth Damage Table

The FIST system uses an input digital data file to describe the percent damage to structure as a function of water depth. An example of this file is provided in Figure B2. A text description of this data file is as follows:

column 1: Depth of the water in the structure
column 2: Percent damage to a two story residential structure
column 3: Percent damage to a one story residential structure
column 4: Percent damage to a commercial structure
column 5: Percent damage to a professional structure
column 6: Percent damage to an industrial structure
column 7: Percent damage to a public structure
column 8: Percent damage to a semi-public structure
column 9: Percent damage to a recreational structure
column 10: Percent damage to a warehouse
column 11: Percent damage to a mobile home

Structure Contents Depth Damage Table

The FIST system also uses an input digital data file to describe the damage to the structure contents as a function of water depth. An example of this data file is provided in Figure B3. The text description of the data file is as follows:

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
-0.5000	0.0050	0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0300
-0.4000	0.0150	0.0250	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0640
-0.3000	0.0250	0.0450	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0980
-0.2000	0.0350	0.0650	0.0294	0.0294	0.0294	0.0294	0.0294	0.0294	0.0294	0.1320
-0.1000	0.0450	0.0850	0.0392	0.0392	0.0392	0.0392	0.0392	0.0392	0.0392	0.1660
-0.0000	0.0550	0.1050	0.0490	0.0490	0.0490	0.0490	0.0490	0.0490	0.0490	0.2000
0.1000	0.0626	0.1220	0.0564	0.0564	0.0564	0.0564	0.0564	0.0564	0.0564	0.2440
0.2000	0.0700	0.1390	0.0638	0.0638	0.0638	0.0638	0.0638	0.0638	0.0638	0.2880
0.3000	0.0780	0.1560	0.0712	0.0712	0.0712	0.0712	0.0712	0.0712	0.0712	0.3320
0.4000	0.0850	0.1730	0.0786	0.0786	0.0786	0.0786	0.0786	0.0786	0.0786	0.3760
0.5000	0.0930	0.1900	0.0860	0.0860	0.0860	0.0860	0.0860	0.0860	0.0860	0.4200
0.6000	0.1140	0.2150	0.0926	0.0926	0.0926	0.0926	0.0926	0.0926	0.0926	0.5060
0.7000	0.1280	0.2400	0.0992	0.0992	0.0992	0.0992	0.0992	0.0992	0.0992	0.5920
0.8000	0.1450	0.2650	0.1058	0.1058	0.1058	0.1058	0.1058	0.1058	0.1058	0.6780
0.9000	0.1530	0.2900	0.1124	0.1124	0.1124	0.1124	0.1124	0.1124	0.1124	0.7640
1.0000	0.1800	0.3150	0.1190	0.1190	0.1190	0.1190	0.1190	0.1190	0.1190	0.8500
1.1000	0.1840	0.3270	0.1238	0.1238	0.1238	0.1238	0.1238	0.1238	0.1238	0.8560
1.2000	0.1870	0.3390	0.1286	0.1286	0.1286	0.1286	0.1286	0.1286	0.1286	0.8620
1.3000	0.1910	0.3510	0.1334	0.1334	0.1334	0.1334	0.1334	0.1334	0.1334	0.8680
1.4000	0.1940	0.3630	0.1382	0.1382	0.1382	0.1382	0.1382	0.1382	0.1382	0.8740
1.5000	0.1980	0.3750	0.1430	0.1430	0.1430	0.1430	0.1430	0.1430	0.1430	0.8800
1.6000	0.1984	0.3770	0.1478	0.1478	0.1478	0.1478	0.1478	0.1478	0.1478	0.8860
1.7000	0.1988	0.3790	0.1526	0.1526	0.1526	0.1526	0.1526	0.1526	0.1526	0.8920
1.8000	0.1992	0.3810	0.1574	0.1574	0.1574	0.1574	0.1574	0.1574	0.1574	0.8980
1.9000	0.1996	0.3830	0.1622	0.1622	0.1622	0.1622	0.1622	0.1622	0.1622	0.9040
2.0000	0.2000	0.3850	0.1672	0.1672	0.1672	0.1672	0.1672	0.1672	0.1672	0.9100
2.1000	0.2016	0.3850	0.1698	0.1698	0.1698	0.1698	0.1698	0.1698	0.1698	0.9140
2.2000	0.2032	0.3850	0.1726	0.1726	0.1726	0.1726	0.1726	0.1726	0.1726	0.9180
2.3000	0.2048	0.3850	0.1754	0.1754	0.1754	0.1754	0.1754	0.1754	0.1754	0.9220
2.4000	0.2064	0.3850	0.1782	0.1782	0.1782	0.1782	0.1782	0.1782	0.1782	0.9260
2.5000	0.2080	0.3850	0.1810	0.1810	0.1810	0.1810	0.1810	0.1810	0.1810	0.9300

Figure B2. Structure depth damage table (Sheet 1 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
2.6000	0.2104	0.3890	0.1838	0.1838	0.1838	0.1838	0.1838	0.1838	0.1838	0.9420
2.7000	0.2128	0.3930	0.1866	0.1866	0.1866	0.1866	0.1866	0.1866	0.1866	0.9540
2.8000	0.2152	0.3970	0.1894	0.1894	0.1894	0.1894	0.1894	0.1894	0.1894	0.9660
2.9000	0.2176	0.4010	0.1922	0.1922	0.1922	0.1922	0.1922	0.1922	0.1922	0.9780
3.0000	0.2200	0.4050	0.1950	0.1950	0.1950	0.1950	0.1950	0.1950	0.1950	0.9900
3.1000	0.2220	0.4080	0.1969	0.1969	0.1969	0.1969	0.1969	0.1969	0.1969	0.9920
3.2000	0.2240	0.4100	0.1988	0.1988	0.1988	0.1988	0.1988	0.1988	0.1988	0.9940
3.3000	0.2260	0.4130	0.2007	0.2007	0.2007	0.2007	0.2007	0.2007	0.2007	0.9960
3.4000	0.2280	0.4150	0.2026	0.2026	0.2026	0.2026	0.2026	0.2026	0.2026	0.9980
3.5000	0.2300	0.4180	0.2045	0.2045	0.2045	0.2045	0.2045	0.2045	0.2045	1.0000
3.6000	0.2340	0.4260	0.2064	0.2064	0.2064	0.2064	0.2064	0.2064	0.2064	1.0000
3.7000	0.2380	0.4340	0.2083	0.2083	0.2083	0.2083	0.2083	0.2083	0.2083	1.0000
3.8000	0.2420	0.4420	0.2102	0.2102	0.2102	0.2102	0.2102	0.2102	0.2102	1.0000
3.9000	0.2460	0.4500	0.2121	0.2121	0.2121	0.2121	0.2121	0.2121	0.2121	1.0000
4.0000	0.2500	0.4580	0.2140	0.2140	0.2140	0.2140	0.2140	0.2140	0.2140	1.0000
4.1000	0.2520	0.4630	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	1.0000
4.2000	0.2540	0.4670	0.2154	0.2154	0.2154	0.2154	0.2154	0.2154	0.2154	1.0000
4.3000	0.2560	0.4720	0.2161	0.2161	0.2161	0.2161	0.2161	0.2161	0.2161	1.0000
4.4000	0.2580	0.4770	0.2168	0.2168	0.2168	0.2168	0.2168	0.2168	0.2168	1.0000
4.5000	0.2600	0.4820	0.2175	0.2175	0.2175	0.2175	0.2175	0.2175	0.2175	1.0000
4.6000	0.2620	0.4860	0.2182	0.2182	0.2182	0.2182	0.2182	0.2182	0.2182	1.0000
4.7000	0.2640	0.4910	0.2189	0.2189	0.2189	0.2189	0.2189	0.2189	0.2189	1.0000
4.8000	0.2660	0.4960	0.2196	0.2196	0.2196	0.2196	0.2196	0.2196	0.2196	1.0000
4.9000	0.2680	0.5000	0.2203	0.2203	0.2203	0.2203	0.2203	0.2203	0.2203	1.0000
5.0000	0.2700	0.5050	0.2210	0.2210	0.2210	0.2210	0.2210	0.2210	0.2210	1.0000
5.1000	0.2740	0.5100	0.2212	0.2212	0.2212	0.2212	0.2212	0.2212	0.2212	1.0000
5.2000	0.2780	0.5150	0.2214	0.2214	0.2214	0.2214	0.2214	0.2214	0.2214	1.0000
5.3000	0.2820	0.5200	0.2216	0.2216	0.2216	0.2216	0.2216	0.2216	0.2216	1.0000
5.4000	0.2860	0.5250	0.2218	0.2218	0.2218	0.2218	0.2218	0.2218	0.2218	1.0000
5.5000	0.2900	0.5300	0.2220	0.2220	0.2220	0.2220	0.2220	0.2220	0.2220	1.0000

Figure B2. (Sheet 2 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
5.6000	0.2900	0.5310	0.2222	0.2222	0.2222	0.2222	0.2222	0.2222	0.2222	1.0000
5.7000	0.2900	0.5320	0.2224	0.2224	0.2224	0.2224	0.2224	0.2224	0.2224	1.0000
5.8000	0.2900	0.5330	0.2226	0.2226	0.2226	0.2226	0.2226	0.2226	0.2226	1.0000
5.9000	0.2900	0.5340	0.2228	0.2228	0.2228	0.2228	0.2228	0.2228	0.2228	1.0000
6.0000	0.2900	0.5350	0.2230	0.2230	0.2230	0.2230	0.2230	0.2230	0.2230	1.0000
6.1000	0.2900	0.5350	0.2237	0.2237	0.2237	0.2237	0.2237	0.2237	0.2237	1.0000
6.2000	0.2900	0.5350	0.2244	0.2244	0.2244	0.2244	0.2244	0.2244	0.2244	1.0000
6.3000	0.2900	0.5350	0.2251	0.2251	0.2251	0.2251	0.2251	0.2251	0.2251	1.0000
6.4000	0.2900	0.5350	0.2258	0.2258	0.2258	0.2258	0.2258	0.2258	0.2258	1.0000
6.5000	0.2900	0.5350	0.2265	0.2265	0.2265	0.2265	0.2265	0.2265	0.2265	1.0000
6.6000	0.2906	0.5350	0.2272	0.2272	0.2272	0.2272	0.2272	0.2272	0.2272	1.0000
6.7000	0.2912	0.5350	0.2279	0.2279	0.2279	0.2279	0.2279	0.2279	0.2279	1.0000
6.8000	0.2918	0.5350	0.2286	0.2286	0.2286	0.2286	0.2286	0.2286	0.2286	1.0000
6.9000	0.2924	0.5350	0.2293	0.2293	0.2293	0.2293	0.2293	0.2293	0.2293	1.0000
7.0000	0.2930	0.5350	0.2300	0.2300	0.2300	0.2300	0.2300	0.2300	0.2300	1.0000
7.1000	0.2934	0.5350	0.2317	0.2317	0.2317	0.2317	0.2317	0.2317	0.2317	1.0000
7.2000	0.2938	0.5350	0.2334	0.2334	0.2334	0.2334	0.2334	0.2334	0.2334	1.0000
7.3000	0.2942	0.5350	0.2351	0.2351	0.2351	0.2351	0.2351	0.2351	0.2351	1.0000
7.4000	0.2946	0.5350	0.2368	0.2368	0.2368	0.2368	0.2368	0.2368	0.2368	1.0000
7.5000	0.2950	0.5350	0.2385	0.2385	0.2385	0.2385	0.2385	0.2385	0.2385	1.0000
7.6000	0.2990	0.5460	0.2402	0.2402	0.2402	0.2402	0.2402	0.2402	0.2402	1.0000
7.7000	0.3030	0.5560	0.2419	0.2419	0.2419	0.2419	0.2419	0.2419	0.2419	1.0000
7.8000	0.3070	0.5670	0.2436	0.2436	0.2436	0.2436	0.2436	0.2436	0.2436	1.0000
7.9000	0.3110	0.5770	0.2453	0.2453	0.2453	0.2453	0.2453	0.2453	0.2453	1.0000
8.0000	0.3150	0.5880	0.2470	0.2470	0.2470	0.2470	0.2470	0.2470	0.2470	1.0000
8.1000	0.3150	0.5880	0.2496	0.2496	0.2496	0.2496	0.2496	0.2496	0.2496	1.0000
8.2000	0.3150	0.5880	0.2522	0.2522	0.2522	0.2522	0.2522	0.2522	0.2522	1.0000
8.3000	0.3150	0.5880	0.2548	0.2548	0.2548	0.2548	0.2548	0.2548	0.2548	1.0000
8.4000	0.3150	0.5880	0.2574	0.2574	0.2574	0.2574	0.2574	0.2574	0.2574	1.0000
8.5000	0.3150	0.5880	0.2600	0.2600	0.2600	0.2600	0.2600	0.2600	0.2600	1.0000

Figure B2. (Sheet 3 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
8.6000	0.3250	0.5880	0.2626	0.2626	0.2626	0.2626	0.2626	0.2626	0.2626	1.0000
8.7000	0.3350	0.5880	0.2652	0.2652	0.2652	0.2652	0.2652	0.2652	0.2652	1.0000
8.8000	0.3450	0.5880	0.2678	0.2678	0.2678	0.2678	0.2678	0.2678	0.2678	1.0000
8.9000	0.3550	0.5880	0.2704	0.2704	0.2704	0.2704	0.2704	0.2704	0.2704	1.0000
9.0000	0.3650	0.5880	0.2730	0.2730	0.2730	0.2730	0.2730	0.2730	0.2730	1.0000
9.1000	0.3730	0.5880	0.2764	0.2764	0.2764	0.2764	0.2764	0.2764	0.2764	1.0000
9.2000	0.3810	0.5880	0.2798	0.2798	0.2798	0.2798	0.2798	0.2798	0.2798	1.0000
9.3000	0.3890	0.5880	0.2832	0.2832	0.2832	0.2832	0.2832	0.2832	0.2832	1.0000
9.4000	0.3970	0.5880	0.2866	0.2866	0.2866	0.2866	0.2866	0.2866	0.2866	1.0000
9.5000	0.4050	0.5880	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	1.0000
9.6000	0.4136	0.5880	0.2936	0.2936	0.2936	0.2936	0.2936	0.2936	0.2936	1.0000
9.7000	0.4222	0.5880	0.2972	0.2972	0.2972	0.2972	0.2972	0.2972	0.2972	1.0000
9.8000	0.4308	0.5880	0.3008	0.3008	0.3008	0.3008	0.3008	0.3008	0.3008	1.0000
9.9000	0.4394	0.5880	0.3044	0.3044	0.3044	0.3044	0.3044	0.3044	0.3044	1.0000
10.0000	0.4480	0.5880	0.3080	0.3080	0.3080	0.3080	0.3080	0.3080	0.3080	1.0000
10.1000	0.4480	0.5880	0.3124	0.3124	0.3124	0.3124	0.3124	0.3124	0.3124	1.0000
10.2000	0.4480	0.5880	0.3168	0.3168	0.3168	0.3168	0.3168	0.3168	0.3168	1.0000
10.3000	0.4480	0.5880	0.3212	0.3212	0.3212	0.3212	0.3212	0.3212	0.3212	1.0000
10.4000	0.4480	0.5880	0.3256	0.3256	0.3256	0.3256	0.3256	0.3256	0.3256	1.0000
10.5000	0.4480	0.5880	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	1.0000
10.6000	0.4480	0.5880	0.3344	0.3344	0.3344	0.3344	0.3344	0.3344	0.3344	1.0000
10.7000	0.4480	0.5880	0.3388	0.3388	0.3388	0.3388	0.3388	0.3388	0.3388	1.0000
10.8000	0.4480	0.5880	0.3432	0.3432	0.3432	0.3432	0.3432	0.3432	0.3432	1.0000
10.9000	0.4480	0.5880	0.3476	0.3476	0.3476	0.3476	0.3476	0.3476	0.3476	1.0000
11.0000	0.4480	0.5880	0.3520	0.3520	0.3520	0.3520	0.3520	0.3520	0.3520	1.0000
11.1000	0.4480	0.5880	0.3556	0.3556	0.3556	0.3556	0.3556	0.3556	0.3556	1.0000
11.2000	0.4480	0.5880	0.3592	0.3592	0.3592	0.3592	0.3592	0.3592	0.3592	1.0000
11.3000	0.4480	0.5880	0.3628	0.3628	0.3628	0.3628	0.3628	0.3628	0.3628	1.0000
11.4000	0.4480	0.5880	0.3664	0.3664	0.3664	0.3664	0.3664	0.3664	0.3664	1.0000
11.5000	0.4480	0.5880	0.3700	0.3700	0.3700	0.3700	0.3700	0.3700	0.3700	1.0000

Figure B2. (Sheet 4 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
11.6000	0.4484	0.5880	0.3736	0.3736	0.3736	0.3736	0.3736	0.3736	0.3736	1.0000
11.7000	0.4488	0.5880	0.3772	0.3772	0.3772	0.3772	0.3772	0.3772	0.3772	1.0000
11.8000	0.4492	0.5880	0.3808	0.3808	0.3808	0.3808	0.3808	0.3808	0.3808	1.0000
11.9000	0.4496	0.5880	0.3844	0.3844	0.3844	0.3844	0.3844	0.3844	0.3844	1.0000
12.0000	0.4500	0.5880	0.3880	0.3880	0.3880	0.3880	0.3880	0.3880	0.3880	1.0000
12.1000	0.4500	0.5880	0.3910	0.3910	0.3910	0.3910	0.3910	0.3910	0.3910	1.0000
12.2000	0.4500	0.5880	0.3946	0.3946	0.3946	0.3946	0.3946	0.3946	0.3946	1.0000
12.3000	0.4500	0.5880	0.3979	0.3979	0.3979	0.3979	0.3979	0.3979	0.3979	1.0000
12.4000	0.4500	0.5880	0.4012	0.4012	0.4012	0.4012	0.4012	0.4012	0.4012	1.0000
12.5000	0.4500	0.5880	0.4045	0.4045	0.4045	0.4045	0.4045	0.4045	0.4045	1.0000
12.6000	0.4530	0.5880	0.4078	0.4078	0.4078	0.4078	0.4078	0.4078	0.4078	1.0000
12.7000	0.4560	0.5880	0.4111	0.4111	0.4111	0.4111	0.4111	0.4111	0.4111	1.0000
12.8000	0.4590	0.5880	0.4144	0.4144	0.4144	0.4144	0.4144	0.4144	0.4144	1.0000
12.9000	0.4620	0.5880	0.4177	0.4177	0.4177	0.4177	0.4177	0.4177	0.4177	1.0000
13.0000	0.4650	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.1000	0.4690	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.2000	0.4730	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.3000	0.4770	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.4000	0.4810	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.5000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.6000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.7000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.8000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
13.9000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.0000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.1000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.2000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.3000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.4000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.5000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000

Figure B2. (Sheet 5 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
14.6000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.7000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.8000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
14.9000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.0000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.1000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.2000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.3000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.4000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.5000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.6000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.7000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.8000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
15.9000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000
16.0000	0.4850	0.5880	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	0.4210	1.0000

Figure B2. (Sheet 6 of 6)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
-0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-0.4000	0.0000	0.0000	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296	0.0000
-0.3000	0.0000	0.0000	0.0592	0.0592	0.0592	0.0592	0.0592	0.0592	0.0592	0.0000
-0.2000	0.0000	0.0000	0.0888	0.0888	0.0888	0.0888	0.0888	0.0888	0.0888	0.0000
-0.1000	0.0000	0.0000	0.1184	0.1184	0.1184	0.1184	0.1184	0.1184	0.1184	0.0000
-0.0000	0.0000	0.0000	0.1480	0.1480	0.1480	0.1480	0.1480	0.1480	0.1480	0.0000
0.1000	0.0360	0.0360	0.1662	0.1662	0.1662	0.1662	0.1662	0.1662	0.1662	0.0360
0.2000	0.0720	0.0720	0.1844	0.1844	0.1844	0.1844	0.1844	0.1844	0.1844	0.0720
0.3000	0.1080	0.1080	0.2026	0.2026	0.2026	0.2026	0.2026	0.2026	0.2026	0.1080
0.4000	0.1440	0.1440	0.2208	0.2208	0.2208	0.2208	0.2208	0.2208	0.2208	0.1440
0.5000	0.1800	0.1800	0.2390	0.2390	0.2390	0.2390	0.2390	0.2390	0.2390	0.1800
0.6000	0.1980	0.1980	0.2536	0.2536	0.2536	0.2536	0.2536	0.2536	0.2536	0.1980
0.7000	0.2160	0.2160	0.2682	0.2682	0.2682	0.2682	0.2682	0.2682	0.2682	0.2160
0.8000	0.2340	0.2340	0.2828	0.2828	0.2828	0.2828	0.2828	0.2828	0.2828	0.2340
0.9000	0.2520	0.2520	0.2974	0.2974	0.2974	0.2974	0.2974	0.2974	0.2974	0.2520
1.0000	0.2700	0.2700	0.3120	0.3120	0.3120	0.3120	0.3120	0.3120	0.3120	0.2700
1.1000	0.2880	0.2880	0.3239	0.3239	0.3239	0.3239	0.3239	0.3239	0.3239	0.2880
1.2000	0.3060	0.3060	0.3358	0.3358	0.3358	0.3358	0.3358	0.3358	0.3358	0.3060
1.3000	0.3240	0.3240	0.3477	0.3477	0.3477	0.3477	0.3477	0.3477	0.3477	0.3240
1.4000	0.3420	0.3420	0.3596	0.3596	0.3596	0.3596	0.3596	0.3596	0.3596	0.3420
1.5000	0.3600	0.3600	0.3715	0.3715	0.3715	0.3715	0.3715	0.3715	0.3715	0.3600
1.6000	0.3760	0.3760	0.3834	0.3834	0.3834	0.3834	0.3834	0.3834	0.3834	0.3760
1.7000	0.3920	0.3920	0.3953	0.3953	0.3953	0.3953	0.3953	0.3953	0.3953	0.3920
1.8000	0.4080	0.4080	0.4072	0.4072	0.4072	0.4072	0.4072	0.4072	0.4072	0.4080
1.9000	0.4240	0.4240	0.4191	0.4191	0.4191	0.4191	0.4191	0.4191	0.4191	0.4240
2.0000	0.4400	0.4400	0.4310	0.4310	0.4310	0.4310	0.4310	0.4310	0.4310	0.4400
2.1000	0.4500	0.4500	0.4408	0.4408	0.4408	0.4408	0.4408	0.4408	0.4408	0.4500
2.2000	0.4600	0.4600	0.4506	0.4506	0.4506	0.4506	0.4506	0.4506	0.4506	0.4600
2.3000	0.4700	0.4700	0.4604	0.4604	0.4604	0.4604	0.4604	0.4604	0.4604	0.4700
2.4000	0.4800	0.4800	0.4702	0.4702	0.4702	0.4702	0.4702	0.4702	0.4702	0.4800
2.5000	0.4900	0.4900	0.4800	0.4800	0.4800	0.4800	0.4800	0.4800	0.4800	0.4900

Figure B3. Depth damage table for structure contents (Sheet 1 of 4)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
2.6000	0.5000	0.5000	0.4898	0.4898	0.4898	0.4898	0.4898	0.4898	0.4898	0.5000
2.7000	0.5100	0.5100	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.5100
2.8000	0.5200	0.5200	0.5094	0.5094	0.5094	0.5094	0.5094	0.5094	0.5094	0.5200
2.9000	0.5300	0.5300	0.5192	0.5192	0.5192	0.5192	0.5192	0.5192	0.5192	0.5300
3.0000	0.5400	0.5400	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5290	0.5400
3.1000	0.5480	0.5480	0.5368	0.5368	0.5368	0.5368	0.5368	0.5368	0.5368	0.5480
3.2000	0.5560	0.5560	0.5446	0.5446	0.5446	0.5446	0.5446	0.5446	0.5446	0.5560
3.3000	0.5640	0.5640	0.5524	0.5524	0.5524	0.5524	0.5524	0.5524	0.5524	0.5640
3.4000	0.5720	0.5720	0.5602	0.5602	0.5602	0.5602	0.5602	0.5602	0.5602	0.5720
3.5000	0.5800	0.5800	0.5680	0.5680	0.5680	0.5680	0.5680	0.5680	0.5680	0.5800
3.6000	0.5900	0.5900	0.5758	0.5758	0.5758	0.5758	0.5758	0.5758	0.5758	0.5900
3.7000	0.6000	0.6000	0.5836	0.5836	0.5836	0.5836	0.5836	0.5836	0.5836	0.6000
3.8000	0.6100	0.6100	0.5914	0.5914	0.5914	0.5914	0.5914	0.5914	0.5914	0.6100
3.9000	0.6200	0.6200	0.5992	0.5992	0.5992	0.5992	0.5992	0.5992	0.5992	0.6200
4.0000	0.6300	0.6300	0.6070	0.6070	0.6070	0.6070	0.6070	0.6070	0.6070	0.6300
4.1000	0.6340	0.6340	0.6129	0.6129	0.6129	0.6129	0.6129	0.6129	0.6129	0.6340
4.2000	0.6380	0.6380	0.6188	0.6188	0.6188	0.6188	0.6188	0.6188	0.6188	0.6380
4.3000	0.6420	0.6420	0.6247	0.6247	0.6247	0.6247	0.6247	0.6247	0.6247	0.6420
4.4000	0.6460	0.6460	0.6306	0.6306	0.6306	0.6306	0.6306	0.6306	0.6306	0.6460
4.5000	0.6500	0.6500	0.6365	0.6365	0.6365	0.6365	0.6365	0.6365	0.6365	0.6500
4.6000	0.6560	0.6560	0.6424	0.6424	0.6424	0.6424	0.6424	0.6424	0.6424	0.6560
4.7000	0.6620	0.6620	0.6483	0.6483	0.6483	0.6483	0.6483	0.6483	0.6483	0.6620
4.8000	0.6680	0.6680	0.6542	0.6542	0.6542	0.6542	0.6542	0.6542	0.6542	0.6680
4.9000	0.6740	0.6740	0.6601	0.6601	0.6601	0.6601	0.6601	0.6601	0.6601	0.6740
5.0000	0.6800	0.6800	0.6660	0.6660	0.6660	0.6660	0.6660	0.6660	0.6660	0.6800
5.1000	0.6840	0.6840	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6840
5.2000	0.6880	0.6880	0.6740	0.6740	0.6740	0.6740	0.6740	0.6740	0.6740	0.6880
5.3000	0.6920	0.6920	0.6780	0.6780	0.6780	0.6780	0.6780	0.6780	0.6780	0.6920
5.4000	0.6960	0.6960	0.6820	0.6820	0.6820	0.6820	0.6820	0.6820	0.6820	0.6960
5.5000	0.7000	0.7000	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.7000
5.6000	0.7060	0.7060	0.6900	0.6900	0.6900	0.6900	0.6900	0.6900	0.6900	0.7060

Figure B3. (Sheet 2 of 4)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
5.7000	0.7120	0.7120	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.7120
5.8000	0.7180	0.7180	0.6980	0.6980	0.6980	0.6980	0.6980	0.6980	0.6980	0.7180
5.9000	0.7240	0.7240	0.7020	0.7020	0.7020	0.7020	0.7020	0.7020	0.7020	0.7140
6.0000	0.7300	0.7300	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7300
6.1000	0.7320	0.7320	0.7088	0.7088	0.7088	0.7088	0.7088	0.7088	0.7088	0.7320
6.2000	0.7340	0.7340	0.7116	0.7116	0.7116	0.7116	0.7116	0.7116	0.7116	0.7340
6.3000	0.7360	0.7360	0.7144	0.7144	0.7144	0.7144	0.7144	0.7144	0.7144	0.7360
6.4000	0.7380	0.7380	0.7172	0.7172	0.7172	0.7172	0.7172	0.7172	0.7172	0.7380
6.5000	0.7400	0.7400	0.7200	0.7200	0.7200	0.7200	0.7200	0.7200	0.7200	0.7400
6.6000	0.7420	0.7420	0.7228	0.7228	0.7228	0.7228	0.7228	0.7228	0.7228	0.7420
6.7000	0.7440	0.7440	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7440
6.8000	0.7460	0.7460	0.7284	0.7284	0.7284	0.7284	0.7284	0.7284	0.7284	0.7460
6.9000	0.7480	0.7480	0.7312	0.7312	0.7312	0.7312	0.7312	0.7312	0.7312	0.7480
7.0000	0.7500	0.7500	0.7340	0.7340	0.7340	0.7340	0.7340	0.7340	0.7340	0.7500
7.1000	0.7520	0.7520	0.7361	0.7361	0.7361	0.7361	0.7361	0.7361	0.7361	0.7520
7.2000	0.7540	0.7540	0.7382	0.7382	0.7382	0.7382	0.7382	0.7382	0.7382	0.7540
7.3000	0.7560	0.7560	0.7403	0.7403	0.7403	0.7403	0.7403	0.7403	0.7403	0.7560
7.4000	0.7580	0.7580	0.7424	0.7424	0.7424	0.7424	0.7424	0.7424	0.7424	0.7580
7.5000	0.7600	0.7600	0.7445	0.7445	0.7445	0.7445	0.7445	0.7445	0.7445	0.7600
7.6000	0.7640	0.7640	0.7466	0.7466	0.7466	0.7466	0.7466	0.7466	0.7466	0.7640
7.7000	0.7680	0.7680	0.7487	0.7487	0.7487	0.7487	0.7487	0.7487	0.7487	0.7680
7.8000	0.7720	0.7720	0.7508	0.7508	0.7508	0.7508	0.7508	0.7508	0.7508	0.7720
7.9000	0.7760	0.7760	0.7529	0.7529	0.7529	0.7529	0.7529	0.7529	0.7529	0.7760
8.0000	0.7800	0.7800	0.7550	0.7550	0.7550	0.7550	0.7550	0.7550	0.7550	0.7800
8.1000	0.7800	0.7800	0.7565	0.7565	0.7565	0.7565	0.7565	0.7565	0.7565	0.7800
8.2000	0.7800	0.7800	0.7580	0.7580	0.7580	0.7580	0.7580	0.7580	0.7580	0.7800
8.3000	0.7800	0.7800	0.7595	0.7595	0.7595	0.7595	0.7595	0.7595	0.7595	0.7800
8.4000	0.7800	0.7800	0.7610	0.7610	0.7610	0.7610	0.7610	0.7610	0.7610	0.7800
8.5000	0.7800	0.7800	0.7625	0.7625	0.7625	0.7625	0.7625	0.7625	0.7625	0.7800
8.6000	0.7800	0.7800	0.7640	0.7640	0.7640	0.7640	0.7640	0.7640	0.7640	0.7800
8.7000	0.7800	0.7800	0.7655	0.7655	0.7655	0.7655	0.7655	0.7655	0.7655	0.7800

Figure B3. (Sheet 3 of 4)

Water Depth	Two Story No Base	One Story No Base	Com No Base	Prof No Base	Indl No Base	Pub No Base	Spub No Base	Recr No Base	Whse No Base	Mobile Home
8.8000	0.7800	0.7800	0.7670	0.7670	0.7670	0.7670	0.7670	0.7670	0.7670	0.7800
8.9000	0.7800	0.7800	0.7685	0.7685	0.7685	0.7685	0.7685	0.7685	0.7685	0.7800
9.0000	0.7800	0.7800	0.7700	0.7700	0.7700	0.7700	0.7700	0.7700	0.7700	0.7800
9.1000	0.7800	0.7800	0.7712	0.7712	0.7712	0.7712	0.7712	0.7712	0.7712	0.7800
9.2000	0.7800	0.7800	0.7724	0.7724	0.7724	0.7724	0.7724	0.7724	0.7724	0.7800
9.3000	0.7800	0.7800	0.7736	0.7736	0.7736	0.7736	0.7736	0.7736	0.7736	0.7800
9.4000	0.7800	0.7800	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7800
9.5000	0.7800	0.7800	0.7760	0.7760	0.7760	0.7760	0.7760	0.7760	0.7760	0.7800
9.6000	0.7800	0.7800	0.7772	0.7772	0.7772	0.7772	0.7772	0.7772	0.7772	0.7800
9.7000	0.7800	0.7800	0.7784	0.7784	0.7784	0.7784	0.7784	0.7784	0.7784	0.7800
9.8000	0.7800	0.7800	0.7796	0.7796	0.7796	0.7796	0.7796	0.7796	0.7796	0.7800
9.9000	0.7800	0.7800	0.7808	0.7808	0.7808	0.7808	0.7808	0.7808	0.7808	0.7800
10.0000	0.7800	0.7800	0.7820	0.7820	0.7820	0.7820	0.7820	0.7820	0.7820	0.7800

Figure B3. (Sheet 4 of 4)

column 1: Depth of the water in the structure
column 2: Percent damage to the contents of a two story residential structure
column 3: Percent damage to the contents of a one story residential structure
column 4: Percent damage to the contents of a commercial structure
column 5: Percent damage to the contents of a professional structure
column 6: Percent damage to the contents of an industrial structure
column 7: Percent damage to the contents of a public structure
column 8: Percent damage to the contents of a semi-public structure
column 9: Percent damage to the contents of a recreational structure
column 10: Percent damage to the contents of a warehouse
column 11: Percent damage to the contents of a mobile home

Appendix C
Sample Output from the Flood Impact Support Tool (FIST)

The following table (C1) and four graphics (Figures C1-C4) are sample output from FIST for the example shown in Chapter 7 of the main text.

Table C1. Water Resource Unit Vicksburg 031

Damage Estimates for Flood: Flood_v031_49_52_fs
Flood Impact Support Tool

Run Date: September 24, 1996
Natchez Gauge reported at 49.52 ft. (66.80 ft. MSL)
Knox Landing Gauge reported at 55.00 ft. (55 ft. MSL)

I. Acreage Flooded

Cleared	*Wooded*	*Urban*	*Other*	*Total*
21,042	50,595	0	4,622	76,259

II. Crop Losses

Crop	*Acres*	*Damage ($K)*
Soybeans	11,573	0
Cotton	1,052	231
Wheat	3,156	868
Corn	5,261	626
Sorghum	0	0
Rice	0	0
Pasture	0	0
Catfish	0	0
Subtotal	21,042	1,725
NonCrop Loss	0	105
Total	21,042	1,830

III. Structure Losses

Structure Type	*Number*	*Structure Damage*	*Current Damage*	*Total Damage ($K)*
Residential	12	92	94	186
Commercial	5	29	83	112
Industrial	0	0	0	0
Other	1	0	1	1
Total	18	121	178	299

IV. Transportation Losses

Road Type	*Miles*	*Damage ($K)*
Paved	0	0
UnPaved	116	58
Totals	116	58

Total Acres Innundated: 76,259

Total All Cost and Damages: $2,187,000

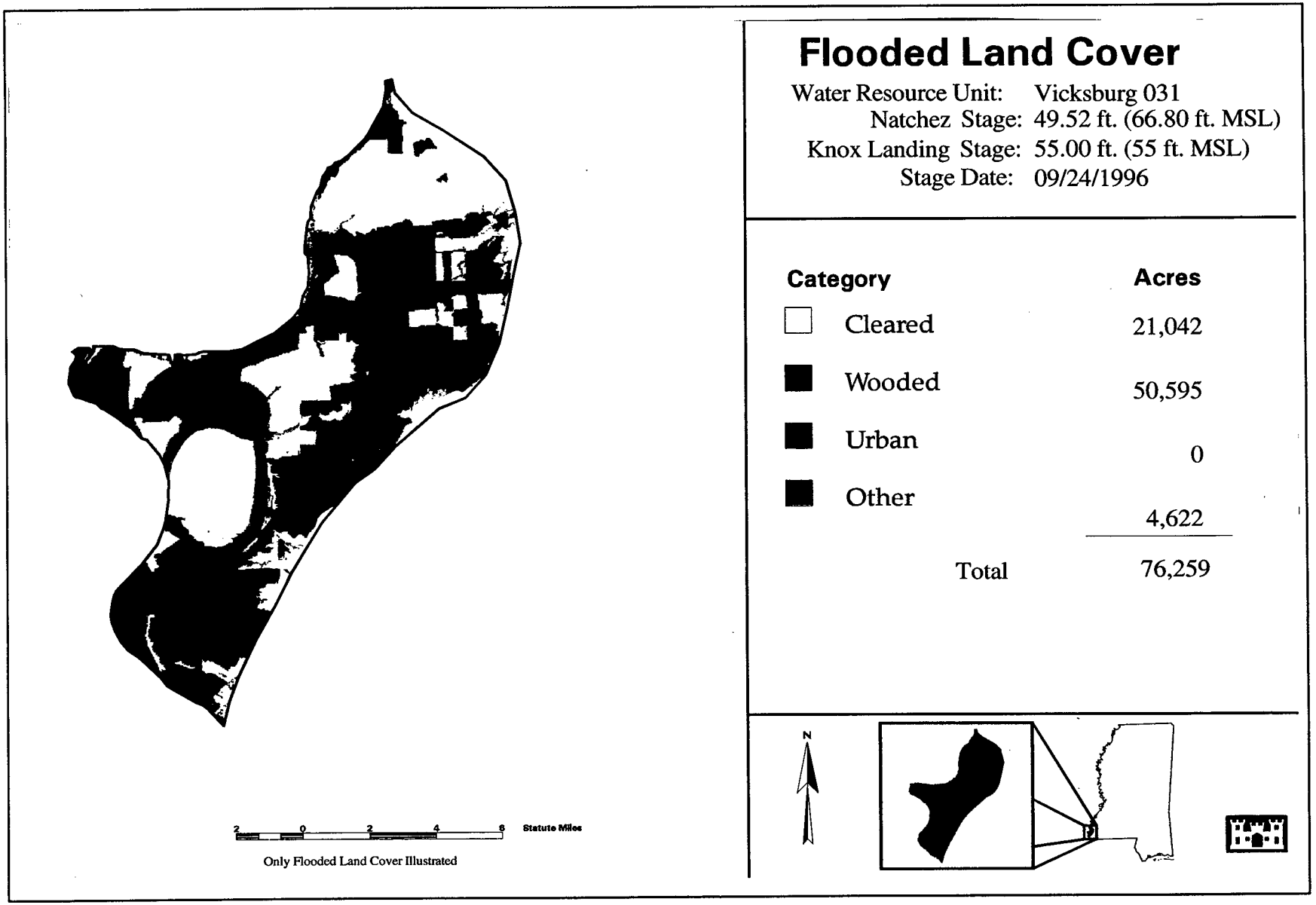


Figure C1. Flooded land cover

Flooded Cleared Land

Water Resource Unit: Vicksburg 031
Natchez Stage: 49.52 ft. (66.80 ft. MSL)
Knox Landing Stage: 55.00 ft. (55 ft. MSL)
FIST Run Date: 09/24/1996

Category	Acres Flooded	Acres Not Flooded
Soybeans	11,573	3,599
Cotton	1,052	327
Wheat	3,156	982
Corn	5,261	1,636
Sorghum	0	0
Rice	0	0
Pasture	0	0
Fallow	0	0
Total	21,042	6,544

Damage	($000)
Crop	1,725
Noncrop	105
Total	1,830

Cleared Land

Flooded

Not Flooded

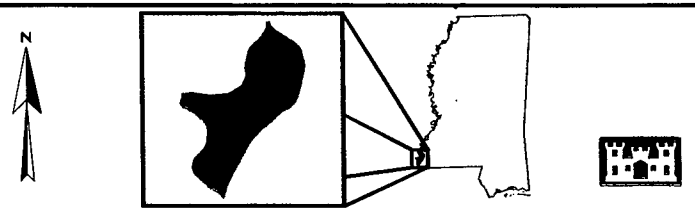


Figure C2. Flooded cleared land

Flooded Structures

Water Resource Unit: Vicksburg 031
Natchez Stage: 49.52 ft. (66.80 ft. MSL)
Knox Landing Stage: 55.00 ft. (55 ft. MSL)
FIST Run Date: 09/24/1996

Flooded Area

Structures	Number
Flooded	18
Not Flooded	227
Total	245

Damage	($000)
Structures	299

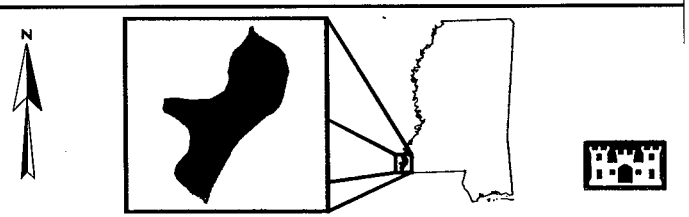


Figure C3. Flooded structures

Flood Summary

Water Resource Unit: Vicksburg 031
Natchez Stage: 49.52 ft. (66.80 ft. MSL)
Knox Landing Stage: 55.00 ft. (55 ft. MSL)
FIST Run Date: 09/24/1996

■ Flooded Area

Damage	($000)
Structures	299
Cleared Land	1,830
Road	58
Other	0
Total	2,187

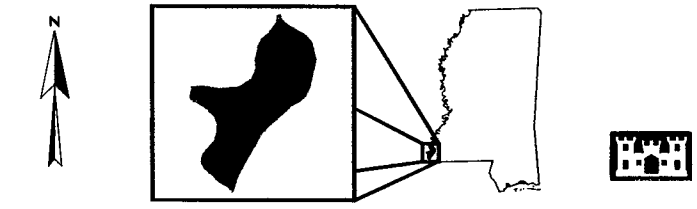


Figure C4. Flood summary

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13. ABSTRACT (*Maximum 200 words*)

This report describes the Flood Impact Support Tool (FIST) which has been developed to provide improved decision-support products related to flood impacts. The graphic-based software capability uses a geospatial-based (GIS assisted) methodology for simulation of flood impacts within designated water resource units (WRUs) within the Mississippi River floodplain. The FIST automates the flood damage calculation process, executes the flood extent calculation, determines and stores the economic damage estimates to structures, crops, and roads, and provides graphic and tabular products. Flood simulations are based on real or forecast gauge readings on the river. Metadata documentation and data formats are described.

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